SUPPLEMENT.

The Mining Journal,

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FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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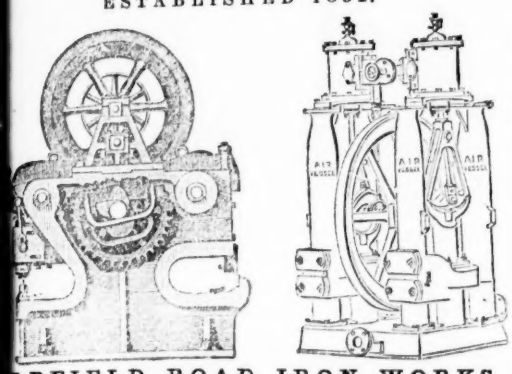

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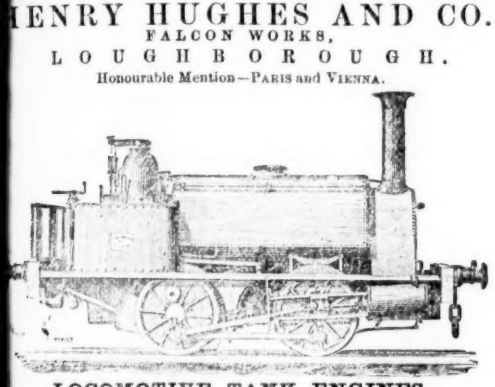

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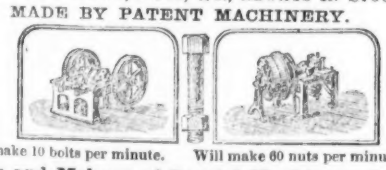

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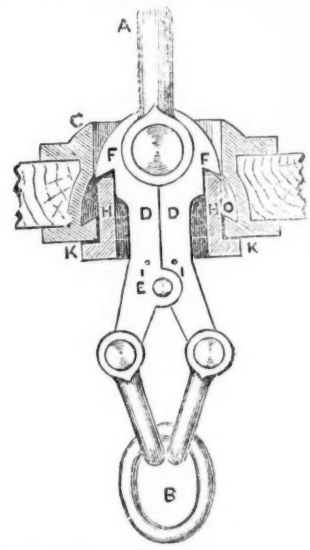

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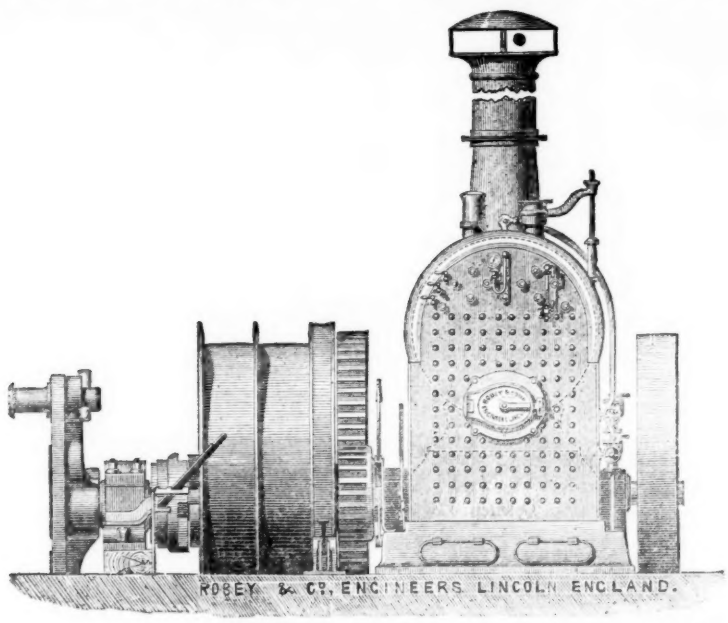

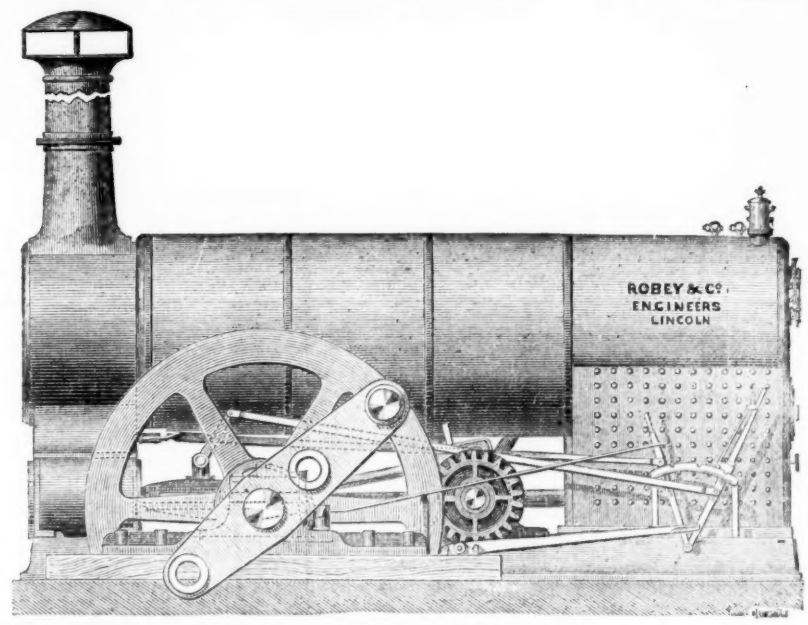

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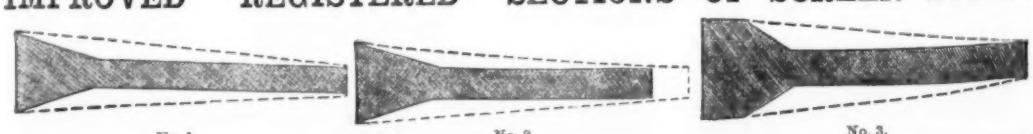

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THE IRON INDUSTRIES OF GLOUCESTERSHIRE, FOREST OF DEAN.

By RICHARD MEADE, Assistant Keeper of Mining Records, Museum of Practical Geology.

The previous notice of this district embraced an acccount of the coal field of the Forest of Dean, statistical details of the production of coal, its distribution coastwise and to foreign countries from the ports of Bristol and Gloucester, together with some general statements of the quantities carried out of the district by railway and canal. In all these returns, except for a few years, the production of the collieries of the Somersetshire coal field were included in those of Gloucestershire. In this notice it is proposed to consider the conditions of occurrence of the important deposits of brown hematite in the Forest of Dean, and the other repositories of ore wrought in Gloucestershire, following with abstracts of production of the several districts, and detailed returns of individual mines, ascertaining as far as possible the distribution of the ore, and distinguishing the quantities retained in the Forest, for reduction in the ironworks, from that sent out of the district.

IRON ORE DEPOSITS OF GLOUCESTERSHIRE.—The valuable ores of iron occurring in the carboniferous or mountain limestone, in the Forest of Dean, appear to have been worked, though on a limited scale, in the beginning of the present century; this fact we glean from the Survey of Gloucestershire, by Mr. Thomas Rudge, who states that in the year 1806 the greater part of the ore employed in the blast-furnaces in the Forest was obtained from Lancashire, and that the ironmasters of the Forest of Dean found it more profitable to import this ore from Lancashire, notwithstanding the high rate of carriage then charged, rather than employ the ores of the district; as the rich character of the Forest hematite became better known the deposits were more fully developed, as the production of recent years will show, the output of the iron mines in the year 1874 having reached 110,203 tons, of the value of 82,653*l*.

These iron ore deposits in the Forest of Dean occur in the millstone grit and the mountain limestone. In the first-named formation the ore is worked but very locally, the principal repositories being found in the mountain limestone, where it exists in irregular chambers or churns, some of which are of considerable extent, yielding many thousands of tons, and having the additional advantage of being worked economically, from the circumstance that no timbering or other supports for the roof is required. The ore is in great request in the ironworks of South Wales and other districts, the quantities annually sent out of the Forest of Dean being steadily on the increase.

Most of the coal fields of Great Britain possess in a greater or less degree productive measures of ironstone; indeed, it may be said that nearly two-thirds of the ironstone raised in the United Kingdom is derived from the argillaceous ores of the coal measures. South Wales, Staffordshire, Derbyshire, Yorkshire and Shropshire, North Wales, and Scotland are amongst our coal field most abundantly supplied with these ores, while, on the other hand, in the coal fields of Durham and Northumberland, Lancashire and the Forest of Dean, these argillaceous ores of iron are of rare occurrence; their absence, however, in this district is amply compensated for by the almost unlimited deposit of brown hematite occurring in the carboniferous limestone—a rock of a tough crystalline character, bluish-grey in colour, and emitting when fractured a sulphurous odour, due to the presence and decomposition of iron pyrites; this limestone is of considerable value commercially, and is extensively employed as a road metal.

As previously stated, the principal repositories of brown hematite in the Forest of Dean occur in the carboniferous or mountain limestone in extensive hollows, or chambers, caverns, or churns; the mines are situated for the most part on the outcrop or basset of the mineral basin, and many of them are worked to a considerable depth. At the Buckshraft Mine, one of the earliest wrought mines in the Forest on the eastern side, the hematite is worked at a depth of 250 yards below the level of the outcrop, while various opinions have been recorded as to the extension of these valuable deposits of brown hematite in depth. The Forest of Dean was carefully examined and reported upon some years since, in 1835, by Thomas Sopwith, Esq., F.R.S., the eminent mining engineer, on behalf of Her Majesty's Commissioners of Woods, Forests, and Land Revenue; the results of this survey were at a later period delineated in a most interesting and instructive model of the Forest of Dean, now deposited in the Museum of Practical Geology, in Jermyn-street. Again, in the year 1855 the officers of the Geological Survey surveyed the Forest under the auspices of the late Sir Henry de la Beche. Generally it may be regarded that the greatest depth of the coal measures in the Forest mineral basin does not exceed 500 yards from the high water level of the River Severn, while the iron ore deposits if they occur are not more than 100 yards below the coal measures; doubtless, with the winning of the brown hematite at this great depth, considerable difficulties will be experienced in the matter of drainage, from the accumulation of water which would be met with in sinking to the deep of the mineral basin through the coal measures. It is stated that in the Shakemantle Pit, at the depth of 120 yards, in the Buckshraft Mine, the quantity of water encountered does not exceed 2000 gallons per minute in the worst season of the year. The pit is considerably below the level of the River Severn, draining, probably, the whole of the waters from the outcrop, a distance of nearly three miles north and south. The cylinder of the pumping-engine employed at the above-named pit by Messrs. Crawshay has a diameter of 60 in., and successfully keeps the mine in fork.

The dip of the strata of the mineral basin near the outcrop on the eastern side of the Forest is about 45°, decreasing gradually towards the centre of the basin, till it reaches the Light Moor Colliery, where it diminishes to 4°, rising again towards the westward, where the strata have the same inclination as on the eastern outcrop.

The question of the occurrence in depth of the hematite ore is an all-important one; it does not appear improbable, and so far as the subterranean operations of the district have been carried, no diminution is apparent either in the quantity or character of the ore wrought; the question has received much attention, and will probably be determined at no distant period, inasmuch as on the eastern side of the Forest, immediately adjoining the Cinderford property of Messrs. Crawshay and Co., are a series of "gales," or royalties, of iron mines known as the Polar Star, Duke of Gloucester, Emperor Napoleon, Berkeley Castle, and Elephant, comprising an area of upwards of 2000 acres, or 3 square miles, and situated some 6 miles north of Lydney, 4½ miles east of Coleford, and 2½ miles west of Newnham, and favourably situated in regard to railway communication, being intersected by two lines.

Within the above-named area it has been recommended that shafts be sunk in suitable positions by the aid of Messrs. Kind's and Chaudron's pit sinking machinery, iron tubbing being employed to deal more effectually with the influx of water expected to be encountered in these operations. An important and extensive work of this kind must of necessity be attended with considerable outlay of capital, and calls for the employment not only of large resources but of great engineering experience and sound judgment in its accomplishment. It is well deserving the attention of the ironmasters connected with these industries in Scotland, in view of securing future supplies to supplement the diminishing resources of the blackband ironstone of Scotland, to aid in the solution of the problem—namely, the discovery of the rich brown hematite deposits, supposed to extend to the centre of the mineral basin in the Forest of Dean. The result will be looked forward to with great interest, its success possessing equal importance not only to the iron and steel industries of the country, but especially to the welfare and prosperity of the Forest of Dean.

PRODUCTION OF BROWN HEMATITE.—The ore raised from the mines of the Forest of Dean is a stalactitic brown hematite, locally known as "brush ore," the more earthy varieties being distinguished as "smith ore." The earliest accessible return is for the year 1854, when the production amounted to 85,506 tons, the output of the following iron mines then in operation.

Names of mines.	Where situated.
Buckshraft	Cinderford.
Dean Pit	Cinderford.
New China Level	Clearwell Meend.
Old Park	Noxon Park.
Old Sling Pit	Lydney Old Park.
Perseverance and Findall	Soudley.
Westbury Brook	Edge Hill, near Mitcheldean.

In subsequent years the production of the Forest iron mines was as follows, the columns side by side showing the quantities sent out of the district to South Wales, Staffordshire, Bristol, and the quantities retained for consumption in the Cinderford and Park End Ironworks, in each of the same years.

	Distribution of the ore.			Used	Total produce of
Year.	South Wales.	Staffordshire.	Bristol.	in ironworks.	Dean Forest.
	Tons.	Tons.	Tons.	Tons.	Tons.
1855	20,810	31,042	—	40,756	92,608
1856	39,450	12,000	—	57,818	109,268
1857	49,049	21,773	—	56,732	127,554
1858	34,652	16,288	—	56,712	107,652
1859	22,587	18,524	1726	63,455	106,292
1860	10,572	11,131	767	67,996	90,466
1861	33,020	483	3444	62,468	100,449

The total production of ore in Dean Forest in the year 1861 includes 1004 tons carried from the western side of the Forest to the Bullo Pill Junction in that year. It was about this period (1861) that the deposits of hematite at Frampton Cotterell, near Bristol—occurring in the Pennant Grit, an arenaceous rock interposing between the upper and lower coal measures—were opened out, the produce of these mines since 1861 has been as follows:—

Frampton Cotterell Iron Mines.

Year.	Quantities.	Year.	Quantities.
1862 Tons	5,107	1868 Tons	6,566
1863	6,000	1869	6,773
1864	11,000	1870	15,249
1865	8,000	1871	8,487
1866	6,000	1872	9,201
1867	6,100	1873	13,682

The production in the year 1874 amounted to 14,842 tons. The other mines of Gloucestershire yielding hematite ore are those at Iron Acton, Saint Pierre, Hopewell, the Countess of Dunraven's, Noxon Park, High Meadow and Lydney Park. The returns of these mines, as shown in the following abstract, are not continuous, some of them being worked but for a few years and finally abandoned.

Year.	Iron Acton.	Saint Pierre.	Hopewell.	Noxon Park.	High Meadow.	Lydney Park.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1863	100	—	—	—	—	—
1864	250	100	—	—	—	—
1865	100	—	1803	22,000	—	—
1866	50	—	—	14,126	—	—
1868	—	—	—	25,000	—	—
1869	—	—	—	30,650	—	—
1870	—	—	—	30,000	—	—
1871	—	—	—	28 500	—	—
1872	—	—	—	10,000	1668	15,695
1873	—	—	—	10,000	2703	12,000
1874	—	—	—	—	4309	5,950

Hitherto the aggregate production of the Forest iron mines has been traced to the year 1861. It will now be convenient to continue the returns since that year, giving side by side the total produce of Gloucestershire, which was first ascertained for the year 1862, and has since been regularly secured by the Mining Record Office, and in which is included the foregoing returns of Iron Acton, Saint Pierce, and other mines:—

	Forest of Dean.		Total of Gloucestershire.	
Years.	Quantities.	Value.	Quantities.	Value.
1862 Tons	158,908	£ 71,508	Tons 164,015	£ 73,806
1863	121,397	54,627	127,497	57,372
1864	130,492	58,723	141,843	63,830
1865	142,807	64.526	152,710	68,982
1866	156,079	70,236	162,129	72,982
1867	156,069	70,231	168,169	70,271
1868	160,742	72,324	167,988	75,333
1869	134,595	60,567	172,023	77,460
1870	138,254	62,214	183,503	82.576
1871	170,611	127,957	207,598	155,060
1872	162,888	122,166	199,453	149,585
1873	163,660*	98,196	199,342	125,447
1874	110,203	82.653	171,428	148,910

The iron made from the ore of the Forest of Dean is especially celebrated for the manufacture of tin-plate, for which purpose it is in great request in the ironworks of South Wales. The value of the ore at the mines in the year 1862 gives an average of 9s. per ton, in the year 1873 an average of 14s. per ton. It may be convenient to have the details of production and value of the ores in the year 1873, which are as follows:—

Mines.	Quantities.	Value.
Forest of Dean and High Meadow Tons	163,660*	£ 98,196
Countess of Dunraven	10,000	7,500
Lydney Park	12,000	9,500
Frampton Cotterell	13,682	10,251
Total	199,342	£125,447

* Including 2703 tons, the produce of the High Meadow Iron Mine.

The returns for the year 1874 show a diminished production when compared with those of the previous year, to the extent of 63,457 tons as regards Dean Forest, and 27,914 tons in the total output of the mines of Gloucestershire. The annexed statement gives the mines of the Forest, with their respective produce of iron ore, in each of the years 1873 and 1874, bringing this information to date:—

Name of iron mine.	1873.		1874.
Buckshraft Tons	30,706	Tons	15,531
China Engine	2,843		1,007
China Level	1,784		—
Clearwell	5,331		3,255
Coleford	—		263
Crow's Nest	5,230		870
Dean's Meend	3,491		3,555
Easter	13,675		7,077
Frog Pit	141		—
New China Level	—		756
New Dun Pit	3,133		3,987
Oakwood Mill (James)	5,289		5,445
Oakwood Mill (Cuthbertson)	4,671		—
Old Bow Pit	5,230		3,234
Old Ham Pit	7,145		3,691
Old Sling Pit	4,988		5,916
Old Park	195		—
Park Hill	208		2,392
Perseverance, &c. (Spark)	—		3,976
Perseverance, &c. (Forest of Dean Iron Company)	3,063		5,088
Perseverance (Goold)	1,469		475
Saint Annals	10,874		9,620
Scar Pit	—		60
Sandstone	30		—
Shraves (T. Hewlett)	720		189
Shraves (J. Shingles)	1,984		1,700
Shraves (Mrs. Hewlett)	—		452
Stope Pit	298		94
Staunton	47		—
Tufthorn	992		640
Westbury Brook	14,112		25,200
Wigpool Belt	22,106		4,753
Yew Tree	1,202		977
Total	160,957		110,203

The total produce of the iron mines of Gloucestershire, amounting to 171,428 tons in the year 1874, is made up as follows:—

Districts and mines.	Quantities.	Value.
Forest of Dean Tons	110,203	£ 82,653
Edge Hill, Westbury Brook*	28,754	
Drybrook, Mitcheldean*	100	28,589
Blistors, Lydney*	598	
Highmeadow Estate—Great Doward	139	2,775
Highmeadow	4,309	
Lydney Park, Lydney	5,950	
Frampton, Cotterell, Bristol	14,842	
Crescent, Clifton, Bristol	3,800	34,893
Winford, Bristol	1,858	
Temple Cloud, Bristol	75	
Nunney, Bristol	800	
Total of Gloucestershire	171,428	£148,910

* Returns from Her Majesty's Inspectors not included in the Forest of Dean returns.

The produce of the iron mines of the United Kingdom in the same year amounted to 14,844,956 tons, of the value of 7,313,146*l*., against 15,577,499 tons, of the value of 7,573,676*l*. in the year 1873. The iron ores imported and smelted in the United Kingdom in each of the same years being 754,141 tons in 1874, and 967,536 tons in 1873.

Before considering the distribution of the Forest of Dean hematite, it will be of some interest to those familiar with the district and interested in its mining operations to have at hand for reference reliable data, showing the produce of the more important iron mines of the district. With this object in view, the following abstracts have been prepared for the purpose of showing the annual produce of the principal iron mines, carrying enquiries as far back as possible in order to render the information complete. The first group to which attention is directed includes those mines in the neighbourhood of Cinderford, on the eastern side of the Forest, from which mines the blast-furnaces of the district have received their supplies of ore for many years; they are as follows:—

Year.	Buckshraft.	Findall, &c.	Westbury Brook.
1863	Tons 44,219	Tons 9,678	Tons 13,659
1864	39,770	9,416	20,501
1865	46,127	13,947	33,822
1866	48,735	10,738	35,495
1867	48,659	15,079	21,810
1868	47,649	14,983	28,060
1869	42,096	11,443	25,825
1870	38,639	8,471	26,352
1871	37,694	8,117	16,005
1872	34,409	3,939	14,693
1873	30,706	4,473	14,112
1874	15,531	9,239	25,200

Taking the production of this group of mines for the year 1874, and two previous years, there is a total produce for 1874 of 49,970 tons, against 49,290 tons in the year 1873, and of 53,041 tons in the year 1872; this falling off is not very considerable, when it is remembered that our mining and metallurgical industries have been during the same period, and continue at the present time, subject to great depression.

The following mines in the district of Clearwell Meend, on the western side of the Forest, have produced the following quantities in each of the same years:—

Year.	Clearwell.	Easter.	Old Bow Pit.
1863 Tons	1,309	Tons 11,398	—
1864	4,693	9,495	—
1865	—	4,543	—
1866	306	5,728	—
1867	1,254	10,435	—
1868	2,151	10,409 Tons	2,981
1869	4,925	11,013	4,317
1870	4,765	9,968	6,191
1871	4,861	17,619	5,181
1872	3,858	14,726	7,131
1873	5,331	13,675	5,230
1874	3,255	7,077	3,234

Here, again, a falling off is observable, due to the cause previously referred to—the depressed condition of the iron trade.

Other mines in the neighbourhood of Lydney and Coleford produced the following tonnages in each of the same years:—

Year.	Oakwood.	Lydney. Old Sling.	Shraves.	Coleford. Crow's Nest.
1863 Tons	4,227	Tons 16,904	Tons 389	Tons 300
1864	5,145	15,940	1,095	4,868
1865	6,484	12,380	553	—
1866	8,742	8,519	819	158
1867	10,251	11,585	886	5,342
1868	2,981	9,952	431	1,109
1869	3,018	4,671	175	4,790
1870	6,804	6,887	756	5,390
1871	6,858	6,285	823	5,782
1872	8,750	7,233	2,295	4,404
1873	9,960	4,988	2,704	5,230
1874	5,445	5,916	2,341	870

The returns of the Deen's Meend Mine of the Dowlais Iron Company, situated near Mitcheldean, and of the Wigpool and Saint Annal's Mines, the last named situated near Cinderford, must not be omitted; they produced the following quantities in each of the years named:—

Year.	Wigpool.	Deen's Meend.	Saint Annal's.
1863 Tons	—	Tons 13,180	Tons —
1864	—	14,768	—
1866	402	12,233	—
1867	124	8,421	—
1868	122	9,813	—
1869	—	8,622	—
1870	6,815	6,231	—
1871	19,792	5,336	3,214
1872	11.729	3,256	9,811
1873	22,106	3,491	10,874
1874	—	3,555	9,620

DISTRIBUTION OF THE FOREST OF DEAN ORE.—Previously we have considered the distribution of the ore up to the year 1861. It will now be desirable to continue the enquiry from that date, and give in detail for a few years the quantities sent respectively to South Wales, South Staffordshire, distinguishing the quantities retained in the Forest for consumption in the ironworks:—

	South Wales.	Staffordshire.	Bullo Pill Junction.	Bristol.	Used in Forest.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1862	49,718	978	8,617	—	99,595	158,908
1864	51,210	32	14,741	335	64,164	130,492
1866	57,904	—	6,000	2074	90,101	156,079
1868	50,068	257	—	—	110,403	160,722
1869	60,449	—	—	—	104,801	165,250

In later years the returns of the Severn and Wye Railway show the distribution of the Forest of Dean ores as follows, the balance of production being retained for use in the furnaces of the district:—

Forwarded.	1870. Tons.	1871. Tons.	1872. Tons.	1873. Tons.
By water to Wales	21,277	23,571	35,540	12,632
Rail to Wales	15,734	9,152	12,154	—
Rail to Bullo Pill	14,291	15,022	12,057	13,252
Rail to Staffordshire	12	1,619	3,855	—
Water to Bristol	148	742	416	150
Water to Gloucester	—	—	3,389	728
Total	51,462	50,106	67,441	56,762

In the year 1874 the ore forwarded amounted to 28,667 tons, of which 2233 tons were conveyed by water into Wales, the remaining 26,434 tons being distributed by rail partly to Wales and Staffordshire.

Analyses of the ores raised in Gloucestershire and Somersetshire, with an account of the spathic carbonate and other deposits of iron, together with detailed returns of production of the mines in the last-named county will form the subject of a future notice.

THE LATE EDWARD GEACH.—In the obituary columns of the Cornish newspapers is recorded the death, on the 24th ult., at the great age of 91 years, of Mr. EDWARD GEACH, of Liskeard, conveyancer-at-law, and for many years the senior member of the Court of Gray's Inn. Mr. Geach has been a man of some note in his native county of Cornwall, not only as a skilled conveyancer of landed estates, and as a draughtsman of wills involving intricate clauses, but also as an arbiter, a dispassionate councillor and adjustor of differences in dispute. He was a promoter, originally, in getting the Caradon mining district worked, nearly 40 years ago. Mr. Geach was often termed the political "Father" of Liskeard, which was quoted by Earl Russell as a pattern borough of the kingdom in purity of election from the period of its enfranchisement, in 1832, when Mr. Geach introduced his young friend, the late Mr. Charles Buller, of Looe, to his co-constituents of Liskeard. Mr. Buller, at an unusually young age, won by his great abilities as an orator and statesman in Parliament the high position of a Minister of the Crown. Mr. Buller died at the early age of a little over 40 years, and represented Liskeard for 14 years, up to the time of his decease. Mr. Geach, from his own great age, and that of his father before him, who lived to the year 1839, also over 90 years, and who was one of the original promoters of the working of the St. Austell china-clay district, would relate many interesting events during epochs of Cornish history. His father would tell of the divine John Wesley (born in 1737), whom he heard preach at Gwennap Pit. The subject of this memoir was an intimate friend of the Cornish philosopher, Dr. Samuel Drew, of St. Austell, the author, at the beginning of this century, of the work on the immortality and immateriality of the human soul. Mr. Geach was one with others—and among them Sir Charles Eastlake, the late President of the Royal Society—who saw the Emperor Napoleon, at Plymouth, on board the British man-of-war ship, the Bellerophon, then departing for St. Helena. Mr. Geach would dilate on the character of the times of Howe's earlier and Nelson's later victories, and of the French refugees landing on the Cornish coast from small open boats, launched at night from the opposite Normandy coast, thereby escaping with their lives from the horrors and carnage of the French revolution, ruled by Marat, Danton, and Robespiere. Among the men of a bygone age who would be seen on foot in the town of Liskeard wending their way on market days in leather or cloth leggings, and long coats, from the neighbouring seat of Boconnoc, were Lord Chatham, and the still greater Minister, his son, William Pitt. Of Cornish politicians, Mr. Geach was of the Trelawny school, and will be long remembered by the natives of Liskeard and its surrounding districts.

DRILLING AND BORING.—The invention of Mr. J. DODGE, of Manchester, consists in an improved compound machine, by which four or other convenient number of holes can be drilled or bored at the same time, and by which the spindles of the drilling or boring tools at opposite sides of the machine are set simultaneously, and in unison with each other. His improved machinery consists of a foundation plate, and of four standards, which are connected by cross slides supporting the boring headstocks; the cross slides are raised or lowered, and the boring headstocks are traversed to and fro on the cross slides by screws, all of which are connected together.

ROTARY ENGINES.—According to the invention of Mr. URBAIN CHAUVEAU, of Paris, a cylinder is arranged with a piston which may be actuated by steam, compressed air, or gas, so as to move round an axis passing through a centre. If a point of the piston rod is forced to move in the space of a fixed circle having for its centre a given point, so that the distance is equal to one half of the stroke of the piston it will be readily understood that the alternate motions of the piston in the cylinder will produce a continuous rotary motion of the said cylinder round the axis. Different arrangements of mechanical parts may be employed to carry out the principle above mentioned, and the construction of rotary engines of this character may be varied to a great extent, and yet act in accordance with the same principle. The admission of steam may be made in any ordinary manner.

Original Correspondence.

THE SUTRO TUNNEL.

SIR,—I have carefully compiled the following particulars from the "Sutro Independent," dated Feb. 19:—Report of progress for the week ending Feb. 15, the header being 8 × 10 feet.

Number of feet driven at last report	12,179
Number of feet driven since	80
Total number of feet in tunnel	12,259

Water.—Quantity, 51 miners' inches; temperature at mouth, 75°; at shaft No. 1, 79°; at shaft No. 2, 81½°; at header, 88°.

Air.—Temperature at mouth, 46°; at shaft No. 1, E., 77°; W., 70°; No. 2, E., 80°; W., 81°; at header, 87°.

Remarks.—The rock drills hard, but blasts fairly.

Progress in widening.

Length widened out up to Feb. 8 ..... Feet	776
Since	238
Total length widened out	1014

Car loads of rock removed from same.

Large	263
Small	464
Total	727

Details of work.—Holes drilled, 255; blasted, 206; aggregate depth, 2124 feet; average depth, 7·9 feet; powder consumed, 889 lbs.; exploders consumed, 307; drills sharpened, 448; rock extracted, car loads, 2 tons each, 530. ARQUERITE.

THE RICHEST MINE IN THE WORLD.

SIR,—On Friday, Feb. 11, the Consolidated Virginia Mining Company paid its twenty-second dividend, twelve of which have been $10 per share each, and ten of $3 per share. The following is a list of the dividends:—

	Per share.	Amount.		Per share.	Amount.
1874—May	$ 3	$ 324,000	1875—May	$10	$1,080,000
June	3	324,000	June	10	1,080,000
July	3	324,000	July	10	1,080,000
August	3	324,000	August	10	1,080,000
September	3	324,000	September	10	1,080,000
October	3	324,000	October	10	1,080,000
November	3	324,000	November	10	1,080,000
December	3	324,000	December	10	1,080,000
1875—January	3	324,000	1876—January	10	1,080,000
February	3	324,000	February	10	1,080,000
March	10	1,080,000			
April	10	1,080,000	Total	$150	$16,200,000

ARQUERITE.

MINERAL WEALTH OF ARIZONA.

SIR,—I have been a reader here of the Journal now for about two years. I find it a perfect cyclopædia of information concerning movements in mining matters all over the world, and I have thought at various times of sending you a letter from Arizona, a place which I think ought to be interesting to your readers from the fact that none of them are financially interested in it. They cannot fail to be somewhat astonished to know that there is a place in the world with an organised community, in a mining country, where English capital has not yet been invested. Some of them may wish there were more places of which the same might be said, but it cannot fail to elicit comment to know there is in fact one such place; not a small place either, for it is as large as England, Ireland, Scotland, and Wales combined (and, of course, contains more mineral wealth than all of them together). Nor is it a new mining country, for the country was extensively worked 200 years ago, and there has been hardly any time since in which mining operations have not been carried on in some place in the territory. If I proceed to mention a few things now concerning this region, let not your prudent readers draw back in alarm.

Arizona comprises a territory of about 120,000 square miles, lying immediately north of Sonora, Mexico, east of the southern half of California, and immediately south of Nevada. The southern part of the territory was purchased by the United States from Mexico, as late as 1853, for the sum of $15,000,000. While it cannot be said to be a well-watered country in the ordinary sense, it is by no means a desert country. The Colorado river waters it on the north and west, while the Gila river traverses it from east to west. It is a fine grazing country, with a large amount of arable land, the latter being principally cultivated by means of irrigation. It has great quantities of superior pine timber in the mountains, the mesquit tree growing on the plains for a distance of from one to five miles from the water-courses. In the northern part they have snow in the winter months—December, January, and February. South of the Gila, which is about midway in the territory, snow hardly ever falls except in the mountains, and even there not in any great quantity. The summers are very warm—Fahrenheit averages about 95° from June to September. The winters in the southern half of the territory furnish the most delightful climate in the world. The chief minerals are gold, silver, and copper, and are found all over the territory. Gold is found principally in the northern and southern parts, and copper and silver in the middle portion.

In the northern part the gold mines at about 30 ft. depth run largely into sulphurets, which have not yet been economically worked. At about the same depth in the southern part the gold veins run into the ground. They are very rich, and pay well for about 30 ft., and then give out. They seem to be true fissure veins, have perfect walls, with polished sides, and with what are called, I believe, by the experts "striated surfaces, showing lines of motion," but they do not pay below 30 ft.—at that depth the gold gives out, and the work has never, that anybody knows of, been prosecuted further. Probably deeper work would bring one into gold again. It is in this southern part the old Spaniards worked. Some of their works on silver veins in this part were carried to the depth of about 200 ft. The work of the old Spaniards ceased about 100 years ago, when there was a general uprising of the Indians of all tribes, and a general enforced exodus of the whites. In one district, about 50 miles west of here, there is still an unsolved mystery. The mountains for a circle of 20 miles in diameter are marked with signs of ancient mining work, yet not a sign of mineral can be found. Regular shafts are sunk, and drifts run from them. They are all on veins of what seems to be a fine hard white clay. What it was mined for no one can tell. The Indians can give no explanation of the works, nor any account of when the work was done.

All over Arizona—wherever there is a mountain range—silver veins are found, good croppings, seemingly well-defined veins, and ore of unusual richness. The richest ores I ever saw are those found in the middle portion of the territory, north and south of the Gila. You would hardly credit statements of things I have actually seen, handled, and tested. I have seen slabs of nearly pure silver 15 in. in length, 9 to 10 in. in width, and over 2 in. thick. None of these have yet been found in place, but have been picked up on the surface, on the mountain side. I have, though, seen large quantities of ore in place, assaying all the way from $5000 to $15,000 per ton. None of the mines containing these have yet been much worked. It is now only about three years since the Apaches have been quieted so that it was safe for prospectors to go into the mountains. It is only within the last twelve or eighteen months that what are claimed to be important discoveries have begun to attract attention. This country has been so entirely without facilities for transportation that it is not strange that no work has yet been done in the way of real mining, but the Southern Pacific Railway is now coming in from San Francisco, and will be into the mining region of Arizona within another year. Then we may look for some legitimate mining, and then you may begin to look for a crop of Arizona mines on the London market. When they come some of them will doubtless have some merit, but just what practical merit they may have will depend on many things besides the mere richness of the ore. Ore can be got from almost any part of Arizona rich enough to set men wild, whether it be of gold, silver, or copper, but the other questions necessary to be answered are—How is it for wood, water, and transportation? When these Arizona mines begin to come to the London market, and you may be sure they will come in about a year from now, when the railway is finished, if your people will pay more attention to a study of the map, showing how they are going to get supplies to the mine and ore to market than to assayers' figures or estimates of amount of ore in sight, it will be better for them in case they invest. There are, doubtless, good mines here. I have not seen all that are called good, but the best mines I have seen here yet, as mines giving promise of staying merit, are the copper mines in the middle region of the territory, but there has not been work enough done yet for anybody to tell anything definite about any of the mines. Some of them are fairly started, and another year of work will enable one to tell something about them. CACTUS.

Tucson, Arizona Territory, U.S.A., Feb. 14.

THE MAXWELL LAND GRANT AND RAILWAY COMPANY.

THE ACTUAL STATE OF ITS PROPERTY, AND ITS COMPLETE HISTORY.

SIR,—Known to your readers by former correspondence with regard to some English and European continental investments in mining property in the United States (and territories) of America, I utilised my visit to New Mexico (now prolonged for the last two months) to gather what information could be had on the spot with regard to the above-named enterprise. I did so at the request of friends in Holland, but think the result will interest many readers of the *Mining Journal* in other parts. I am justified in this supposition, because there is imminent danger pending to the interests of share and bond holders, if they will not be properly represented at once in this territory, as indeed they seem not to be. In what this danger consists will be shown in the following history reaching up to the present time:—

The Mexican Governor Armigo granted, on March 22, 1843, to Carlos Beaubien and Guadalupe Marenda, land designed in the grant by natural boundaries and monuments placed, which boundaries and monuments remain clearly discernible up to the present time. The real boundaries do not materially differ from what they are represented on a map published by Harry Whigham and G. A. Bushnell, in 1873, of the territory of New Mexico, called Morley's Map (Nathan Lane, New York, lithographer). In March, 1843—this is a few weeks after the grant was issued by the Mexican Governor Armigo—the grantees, Beaubien and Maranda, deeded to the same Mexican Governor Armigo one-fourth interest (undecided) in the same grant, but Armigo gave to Carlos Beaubien a power of attorney to look after his interests concerning his fourth part in the said grant. The deed was duly recorded. This Governor Armigo, in 1847, when the American troops were approaching, fled to Old Mexico, but afterwards returned and settled at Sonora, New Mexico, where his daughter married a man named Bara. The heirs of this man Bara have at this time brought suits into Court for the recovery of their interests, and the following parties are made parties to the suit:—The Maxwell Land Grant and Railway Company as proprietors, and Governor Tildon, of New York, and Thomas Scott (the Railway King), of Philadelphia, as trustees of the bonds morgaged on said property; also the actual settlers to whom parts of the grant were sold. The action of Governor Armigo is evidently a *prima facie* evidence of duplicity, and I am sorry to see that this imprint of duplicity, bestowed on it on its birthday, accompanies nearly all and every stage in the history of this tract of land in question. But I will proceed to recite the facts, leaving their illustration to the interested reader.

Still, under Mexican Government a curate of Paos, in the interest of actual settlers on the lands granted, petitioned the Governor, being the successor of Governor Armigo, raising objections against the grant, but the Mexican Departmental Assembly decided in favour of the grantees. After the duplicity of Governor Armigo in this early stage of the history the antagonism between the grantees and the real settlers is the next feature of the case, and as the one has constantly been an essential feature in all transactions connected with the grant, the other is still alive, and, indeed, increasing with time, and it may be said that unless all duplicity in the company's management be at an end, and a reconciliatory policy, though releasing none of the rights in principle, become the future policy of the company, the concern will turn out to be an irretrievable and total loss.

In 1848 New Mexico was conquered by the United States of North America, and the Treaty of Guadaloupe Hidalgo, of Feb. 2, 1848, provided fully for the preservation of title to lands invested in former or actual citizens of Mexico, as follows:—

"Mexicans now established in the territories previously belonging to Mexico, and which remain for the future within the limits of the United States, as defined by the present treaty, shall be free to continue where they now reside, or to return at any time to the Mexican Republic, retaining the property they possess in said territories, or by disposing thereof, and removing the proceeds wheresoever they please, without their being subjected on this account to any contribution, tax, or charge whatever. In said territories property of every kind now belonging to Mexicans not established there should be inviolably respected. The present owners, the heirs of them, and all Mexicans who may hereafter acquire said property by contract, should enjoy with respect to it guarantees equally as ample as if the same belonged to citizens of the United States." And in Article 9—"Mexicans . . . not preserving the character of citizens of the Mexican Republic, conformably with what is stipulated in the preceding article, shall be incorporated into the United States, and be admitted . . . to the enjoyment of all the rights of citizens of the United States, . . . and in the meantime shall be maintained, and in the free enjoyment of their liberty and property."

Therefore, there is no doubt but that a land grant from the Mexican Government, in compliance with the Mexican law, holds good under United States Government. Mr. Lucien B. Maxwell married a daughter of the grantee, Carlos Beaubien, and he becomes from that time the leading and enterprising spirit in the entire management. He buys out the grantee, Guadaloupe Maranda, on May 19, 1868, and also the heirs of Carlos Beaubien, his father-in-law, but it seems that the interests of Governor Armigo were entirely disregarded in all these and future transactions.

On July 22, 1854, a law was enacted by the United States Congress, of which section 8, hereafter quoted, influenced directly the history of the grant, from that time known as the Maxwell grant, in contradiction to the usage of the country naming grants by the names of the first grantees. This law provides in—

"Sec. 8.—And be it further enacted that it shall be the duty of the Surveyor General, under such instructions as may be given by the Secretary of the Interior, to ascertain the origin, nature, character, and extent of all claims to lands under the laws, usages, and customs of Spain and Mexico, and for this purpose may issue notices, summon witnesses, administer oaths, and do and perform all other necessary acts in the premises. He shall make a full report upon all such claims as originated before the cession of the territory to the United States by the treaty of Guadaloupe Hidalgo of 1848, denoting the various grades of title, with his decision as to the validity or invalidity of each of the same under the laws, usages, and customs of the country before its cession to the United States, and shall also make a report in regard to all the pueblos existing in the territory, showing the extent and locality of each, stating the number of inhabitants in the said pueblos respectively, and the nature of their titles to the lands, such report to be made according to the form which may be prescribed by the Secretary of the Interior, which report shall be laid before Congress for such action thereon as may be deemed just and proper, with a view to confirm *bona fide* grants and give full effect to the treaty of 1848 between the United States and Mexico; and until the final action of Congress on such claims all lands shall be reserved from sale or other disposal by the Government, and shall not be subject to the donations granted by the previous provisions of this Act."

In consequence of this legal provision the Surveyor General of New Mexico, Mr. Pelham, reported on Sept. 17, 1857, in favour of the grantees, declaring the grant to be a valid one, and giving the boundaries approximately the same as stated in the original grant, and transmitted his report for the action of Congress.

This report disregarded an existing Mexican law of Aug. 18, 1824, and regulations of Sept. 21, 1828, applicable in the premises and on the case, providing that into no one hand should be granted more land than 11 leagues, which would entitle the two grantees to a total of 22 leagues only. When the report was before Congress this provision of the Mexican law was likewise ignored, and in June 21, 1860 (United States Statutes at large, vol. xii., page 71), the United States Congress confirmed the grant, as reported by Surveyor-General N. Pelham to be 1,817,000 acres of land, or 450 square leagues (about 70 by 60 miles area).

This supreme and sovereign action of Congress secured the total grant (450 leagues) to the grantees, notwithstanding such grant was previously valid really only for 22 leagues under the original grant, because the United States Supreme Court decided in the cases Strother *v.* Lucas, 12 p. 411, and S. S. Field *v.* Seabury, 19—323, 333, "A grant may be made by statute, and a confirmation by law is to all intents and purposes a grant."

It may be, therefore, stated here that there is no doubt but that the grantees and their real assignees have a good title, and that if such title is not forfeited by neglect to protect it no proceedings whatever, whether by private parties or by United States officials, can prevent their title from being ultimately established by the United States judiciary. If Governor Armigo's heirs should succeed in having recognised their claims it would in all events leave three-quarters to the Maxwell Land Grant and Railway Company. It also may be worth considering whether the interests taken locally in the heirs and their associates would not be worth the sacrifice that might be required to make them parties to the future success of the company by an arbitratory and reconciliatory agreement. I am acquainted with neither the heirs nor their attorneys, but their names are such of persons of influence in the territory, and their interest in the object may be worth in future to the company all what would have to be sacrificed to them. Any attempt to stigmatise this opinion as the result of interested outside influence will be on false footing, and the company may have the full opportunity to realise its opportunities.

In 1870 Lucien B. Maxwell bonded the grant, reserving 1500 acres as the home range, to Messrs. S. B. Chaffey (now delegate for Colorado to the United States Congress), Charles F. Hanley, of New York, and Chilcot, of Pueblo, Colorado, according to these gentlemen a privilege to buy the grant for a sum of $650,000.

After this the four enterprising gentlemen—Chaffey, Hanley, Chilcot, and Maxwell—worked together, and a corporation formed, entitled the Maxwell Land Grant and Railway Company. This corporation issued stock (shares) to an amount of $6,000,000; bonds to the amount of $3,000,000, or in total so far $9,000,000. To this amount must be added another loan made by the same company from the Philadelphia Trust and Loan Company, the total amount of which I could not ascertain, but probably amounting to $1,000,000. Thus the probable total capital with which the enterprise is burdened amounts to $10,000,000, and the question naturally arises what has the company received for this amount, and where did it go to? This question may be answered as follows:—Maxwell received $650,000; Chaffey, Hanley, and Chilcot received each $100,000=$300,000, or the property was paid really with $950,000, or with less than $1,000,000. What the price was stipulated as to be paid by the corporation is not publicly known, because none of the pamphlets undoubtedly published on the subject ever reached the inhabitants of the territory or grant, and I did not succeed in securing one, but it is well known that the ulterior Philadelphia loan served to purchase the 15,000 acres reserved home range, and also to make the expenditure for improvements which were made under the administration of S. S. Reed, estimated at about $400,000. It thus is evident that $2,000,000 loan capital and $6,000,000 stock have gone to destinations entirely unknown on the land itself, but I shall follow up the events so far as they are known.

That the loan of $3,000,000 should not be secured without some evidence as to the value of the tract of land to be mortgaged appears very natural, and it appears that Mr. Walson Waddingham secured affidavits from many parties then on the land, amongst others from Messrs. Chas. Bartholemus and Henry N. Hooper. The contents of these affidavits are severely commented upon and criticised by men pretending to be acquainted with the facts. I ascertain should they contain any intimation to such facts that there never have been, nor could have been, steamboats running on any water on the grant, nor that the placer diggings really produced a rent of $20,000 in any year. The United States are selling their land at $1·25 in New Mexico, and at such estimation the entire track would be worth $2 271,250. This value is enhanced by some tracks being gold-bearing. In order to ascertain the product of the placer diggings actually in operation, I enquired from the employees of the only express company whose coaches cross the track for the amount of gold dust and amalgam carried to the railroad terminus, but was assured that if they carried any it was not known to them that they did.

On the other hand, parties pretending to be well informed stated that in 1875 the placer diggings on the grant produced $20,000 in gold, of which 30 per cent. was net profit, and specified the following names as of parties having gained the amounts annexed to their names: Lothian and Co., $30,000; Lynch, $25,000; Hamilton and Co., $15,000; James Seulley, $5000; Central Company, $3000; Peters and Co., $2000; and Montgomery and Co., Buck and Co., Colan and Co., Wolsey and Co., and Jones and Co., with other amounts. Mr. Lynch works a ditch originally constructed by the Merino Water and Mining Company, and successively sold to Shelby and Maxwell, and lastly to Lynch. An income from gold sluicing of $100,000 per year at 8 per cent. would represent $1,250,000. This added to the value of the land would constitute a value of about $3,500,000, which may be considered as a fair estimation of the real value to-day. It is true that the United States hold coal land at $10 an acre, but this is more to be considered as the result of a prudent policy to reserve them as an estimate of real value, as in rare cases sales are made of such lands. As yet, and as even in the State of Illinois, to my knowledge the coal right on good coal land can be bought to-day at the rate of $3 per acre, the Maxwell track bears evidence of underlying coal for a considerable part of it. Also plumbago has been found. The Montezuma Gold Mine is not owned by the Corporation, the Aztec Mine only in part (7-12ths). The settlers, whether recognising the ownership of the Corporation or not, have about $1,000,000 of cattle and $50,000 of sheep grazing on the grant. In connection with the organisation of the Corporation Mr. John Colinson, of London, took the most prominent part, and it is the general impression on the land that the only person fully aware of all the intrinsic points in all the transactions with bonds and shares is Mr. Colinson, of London, the first president of the Corporation. What the inducements were for this gentleman to partake in the formation of the Maxwell Land Grant and Railway Company; what inducements he held forth to his Excellency Governor Tilden, of New York, and to Hon. Thomas Scott, of Philadelphia, to make these gentlemen consent that their names should be connected with a loan transaction of $3,000,000, out of which $950,000 were paid for the land, and the balance of which will in all probability be accounted for in the company's books, but for which there is no apparent equivalent in the shape of improvements on the track to be found—all this is known certainly to Mr. John Colinson.

Difficulties arising with Mr. Lucien B. Maxwell, in consequence of lands being sold previous to his sale to the Corporation, of which the deed made to Messrs. Valdez and Brey was recorded after the investigation by the trustees' attorney, but previous to the deed of trust, by a telegraphic instruction from Mr. Maxwell on the day the said deed of trust was signed. These difficulties were applanished by a release of $100,000 on the part of Mr. Lucien B. Maxwell, out of the purchase-money for his reserved home rent, consisting of a note returned for $75,000, and of $25,000 cash.

Mr. John Colinson, as president of the company, took charge of the business of the company on the grant, but found much to contend with; probably so because he put a great importance on the recognition of the company's rights by the few settlers then on it. A policy of reconciliation with the interests of the actual settlers, and of securing, with their assistance, a decided action with regard to all new comers would, in all probability, have had better result financially and in principle.

The controversy between the owners of the grant and the actual settlers, begun by the curate of Paos, and continued and increased up to the present date, has not, to a small degree, been kindled by the action of the United States Government subsequent to the confirmation by Act of Congress. In accordance with the provisions of the law of June 2, 1862 (Statutes United States XII., 410) money had been deposited by the owners of the grant to have it surveyed and set apart to them, and such survey was partially made when an order was issued by the Department of the Interior (Secretary Int. Col. who by this time had found out what had been ignored in the reports of the Surveyor-General, Mr. Pelham, and also in the action of Congress with the Mexican law, Aug. 18, 1824, and the regulations of Sept. 21, 1826, limiting grants to 11 leagues for every grantee, ordered the money thus deposited to be refunded, unless the owners of the said grant would declare themselves satisfied with 22 leagues instead of 40 leagues. The survey was interrupted, and the money refunded.

Although all men versed in law agree that the error under which Congress acted cannot destroy the validity of the Act, and notwithstanding the decisions of the United States Supreme Court alleged to before, that the Act of Congress made the grant such to all in-

tents and purposes, the United States officials are acting to this very date under the same order of the Secretary of the Interior (Cox). All lines separating the townships (six miles square) have been surveyed by the United States, at an expense of, approximately, $20,000, and preemption and homestead entries are accepted by the United States Land Office as well as payments for lands thus entered by actual settlers under the grant. A late map, compiled from the archives of the Surveyor-General's office in Santa Fé, and to be published shortly in New York, ignores the existence of Maxwell's grant totally. Neither from herders, farmers, or miners rent, lease, or royalty is collected, and it is generally asserted that even the actual agent of the Maxwell Land Grant and Railway Company encourages emigration amongst his Ohio countrymen and relations without even the attempt to have the company's rights recognised. An action, it is true, would explain said agent's position as taken in opposition to the actual precedents of the company. The improvements belonging to the corporation have been sold to the settlers by sheriff's sale for nominal amounts. I examined a house sold for $60, and estimated its cost of construction at $2500. Even the office building of this company has been sold, and is now occupied by the attorney representing the interests of contesting settlers. Thus parties encroach more and more on the rights of the Corporation, and a total change of policy seems the only safeguard. John Colinson left on departing the property in charge of Dr. M. Langwell. Dr. M. Langwell was succeeded by an Englishman—Mr. Whiteman—who began to build up the borough of Cimaron, and bought cattle for the Corporation.

The successor in the presidency of the company (Mr J. Vaughan Reed) in person assisted Mr. Whiteman in his endeavours to build up the estate to a paying business. The Aztec Mill, under Superintendent Bergmann, worked with net profit. Settlers were prevailed upon to recognise the company's rights, and against some of them a judgment in favour of the company was obtained, and rents were collected from settlers and miners. During this administration about $400,000 were spent out of the Philadelphia loan on the premises in the way of legitimate enterprise and prudent improvement; but Mr Reed having left for England, Mr. Whiteman was dismissed. The Hon. Stephen B. Elkins was elected third president of the corporation, on this gentleman being the delegate of New Mexico to the United States Congress, and the attorney at law for the corporation.

On Mr. Elkins's recommendation, Mr. Morley, a surveyor, was employed as superintendent and agent, and as such was requested to go to Europe to meet the board of directors. As the result of this meeting Mr. Elkins on a later visit found his employee to have sown the seed of distrust between the directors and the president, whose patronage had employed Mr. Morley. It is reported that Elkins (the president) did what probably every man having self-respect would have done, he offered his resignation, and it not being accepted, in disgust left things as they stood. As another consequence of Mr. Morley's visit to Europe it must be considered that an agreement then about to be concluded with the Atchison, Topeka, and Santa Fé Railway Company for building their track into and through the Maxwell grant was dropped, and the grant thus far without any railroad connection whatever. The railroad company above-named built since from Pas Animas, Colorado, to Puebla, Colorado, and there seems to day hardly any probability existing of any railway reaching the grant for years to come, notwithstanding Mr. Morley has on the map published under his name not less than three different projected railways crossing the grant. Two gentlemen from Holland visited the grant, one of these gentlemen being Mr. De Groot, who by a strange coincidence is also connected with the Nederland (Caribou) Mining Company, Colorado. Mr. De Groot is managing the Caribou concern now, of which Mr. Van Diest, a clever as well as honest and well-known mining engineer, is the first superintendent. Mr. Moses Anker, the promoter of the Nederland (Caribou) Company, states: "There one gets a better idea of how a mine should not be developed and not be managed than in most mines." (The *Engineering and Mining Journal*, Feb. 17, 1876.) Mr. De Groot and his partner when on the grant, did probably see and hear not half of what I saw and heard, I being a total stranger to all individuals and interests, because nobody took the trouble to surround me with men only of one colour, and to guard me from contact with anyone but those belonging to the official tribe.

It remains now to mention that under a law passed in the last session of the Territorial Legislature the Maxwell Land Grant and Railway Company is actually also trust for $10,000 territorial taxes, and will in all probability be sold out, without much delay, bonds and shares notwithstanding, unless the tax be paid. I will not omit to give a description of the political and other state of affairs on the grant. The state of things is an altogether different one from that in all other parts of New Mexico. The population of the Territory of New Mexico consists, besides a minority of Americans, in general of Mexicans (Spanish descendants with some Indian blood), and of Indians, and both are distinguished by a respect to law from all and any population surrounding them. The Indians are Pueblos and Navajos, living in villages, raising their own crops and manufacturing their own clothes and tools. Since the United States took possession only a single criminal case occurred with the Indians—two of them found a mail bag and searched it, for which crime they were sent to the penitentiary. The Mexicans are a jovial, light-hearted, easily contented class of people. When left alone in the exercise of their Catholic faith they can be led easily in all other matters by those having a better education than they. If these are the general features of the territory of New Mexico they are altogether obliterated on the Maxwell grant, and a more lawless spot cannot be imagined on the earth's surface. At the last election passion ran high. Morley led the opposition against what is called the "Santa Fé ring," which is made the scarecrow for all the evil that events and their own action bring down on the inhabitants of the grant, and the head of which ring was the candidate for delegate, and the President of the Maxwell Land Grant and Railway Company—the Hon. Elkins. But strange to state, on the list of the Republican or ring party, Mr. W. Mills, a young talented lawyer, the representative of the opposing settlers, was candidate for the Legislature, and the Republican party carried the victory.

Shortly after the election the Rev. Mr. Tolby, the Methodist preacher, a countryman of Morley, was killed in a canyon, when rowing towards Cimaron. The mail rider, a Mexican of good standing, was seen to approach in his ride towards the same canyon from the same side at the same time Tolby entered it. This man was shortly afterwards hung to a telegraph pole by a mob, then dropped, and some words, regarded as a confession, wrung from him, drawn up again by the neck to the pole, and when the rope broke shot through the head. As yet nobody of the mob is indicted or arrested. Then other parties were by rumours pointed out as accomplices in the murder, and the mob's fanaticism was kindled against Dr. M. Longwell and Mr. N. Mills, and mob law was reigning, and these men were in imminent danger of being lynched by the mob, when the United States military from Fort Union interfered. Both men have fled their homes, and live in Santa Fé, showing that they have no cause to fly from justice, while they have to fly from mob law. Not to incur the reproach that my report only shows the bad state of things without indicating the remedy, I will state the remedy. The local administration should be reorganised in a collegial shape. 1. An American or Americanised superintendent.—2. An English or Dutch book keeper and cashier.—3. A legal adviser and agent on the spot, and acquainted with all the legal matters. If all or some of these were Catholics it would be so much the better.

This new administration should attempt an agreement with the settlers to bring their cases, or one of them, before the United States Supreme Court for ultimate decision at the expense of the Corporation. The actual President, by a full confidence shown to him by the board of directors and by the bondholders, should be reconciled, and prevailed upon to exercise his influence with the Federal Government in order to let the Secretary of the Interior withdraw from the false position the department has taken. The Archbishop of Santa Fé should be applied to to nominate such priests on the grant as will assist in making the law respected, and, therefore, should receive some dotation in land to assist in establishing charges and pastorates.

The income from the mines or the leases therefrom should be put up at public auction per annum, the purchasers to see to their own rights. Immigration should be assisted, and the Atchison Topeka Santa Fé Railroad be induced to build at least to Cimaron. The land should be declared free at large and to all for grazing purposes, they paying a tenth or twentieth, but a sufficient strong force should be sustained in spring, when the cattle is collected, to collect the royalty for the herds in part of the growth of the herds, and the herds or herders not paying the small royalty in kind should not be allowed to graze unmolested. For these purposes, and for paying the taxes, some money is required, but it is not at all improbable that some of the parties connected with the promotion of the enterprise, on close examination, will be found willing to pass the necessary cheques for all purposes; but then the corporation should beware of a renewal of the influence of the promoters, which hitherto proved itself to such a pernicious extent. F. M. F. CAZIN,

Santa Fé, New Mexico, March 9. Mining and Civil Engineer.

ROSSA GRANDE GOLD MINING COMPANY.

SIR,—Referring to the statements made in the Journal of March 18 (page 299), only just brought to my notice, owing to my illness, and consequent absence from London, I beg to state, at Mr. Gordon's request, that the remarks therein made regarding that gentleman "assisting in providing the necessary means by subscribing his own private capital" have been inserted without authority.

London Wall, March 28. S. LLOYD FOSTER, Chairman.

MINING IN QUEENSLAND.

SIR,—TIN has been coming to hand very slowly since the new year. The receipts at the Warwick Railway terminus during the month of December were—

Stream tin	458 tons	19 cwts.	2 qrs.	9 lbs.
Ingot tin	7	2	0	22
Total	466 tons	1 cwt.	3 qrs.	3 lbs.

Showing an increase of 40 tons on the previous month, and about 30 tons on the same month last year, and only 20 tons less than December, 1873. The receipts for the last quarter of 1875 were—

Stream tin	1428 tons	11 cwts.	2 qrs.	5 lbs.
Ingot tin	44	0	2	0
Total	1472 tons	12 cwts.	0 qrs.	5 lbs.

Showing an increase of over 100 tons on the past quarter in excess of the fourth quarter in 1874.

Until I get the returns from the other outlets of the tin fields I cannot give your readers the total yield for the year, but trust to be able to do so in my next. I have no doubt there will be shown as large a falling off in the past half-year as in the first half of the year already before you. The low price now ruling has already had a considerable effect in the production on the Stanthorpe field. All poor ground has long since been abandoned; but the rich ground is in many places turning out better and better. All sorts of plans have been adopted to cheapen the production, and stream tin is costing much less to raise than it did; besides, the more the ground is worked the more experience is gained by the miners. Less dead work is permitted, and the discoveries, sometimes accidental and at others by prospecting, prove beyond doubt that the supply of stream tin has hardly been touched, yet it is my firm conviction that in ten years' time there will be a greater extent of country being worked, greater population employed, and tin produced at much less cost than at present. Of course, the London price of tin will always have its effect; but at the present price it will pay in many instances to work, and, were such a thing to happen as ingot tin selling at 140*l.*, there are thousands of acres of known country over which a large population would soon be settled. Your Cornwall correspondents need not flatter themselves that they will ever see the supply of Australian tin run short; it will not be in our day. What has become of the 10,000 Cornish miners that started for the Australian tin fields during the first six months of 1875? I have seen or heard nothing about them. I have not heard of even one Cornish miner arriving in Stanthorpe direct from Cornwall. I am afraid your correspondent must have made some mistake. Would he please say where any or all of these 10,000 men went to? Certainly not to the tin fields, where they would be of great advantage to the colony and to themselves.

The yield of gold for the colony of Queensland during the past year was —— ozs., showing an enormous increase. In fact, the northern part of this colony is, like our southern tin fields, untouched, yet, so far as gold is concerned, a few alluvial patches have been discovered and gutted; but how many gulleys are there that the foot of the white man has never yet trod on—how many thousands of miles of country never explored?

In COPPER 1875 has been a dull year, and will long be remembered as such. The extension of our railway system all tends to develope our mineral, especially tin and copper.

An enormously rich discovery of cinnabar and pure quicksilver in pockets has been made in the Palmer district. The reef is 6 ft. wide in slate, dipping westward, running north and south. This is kept quiet at present for want of means, but more about it hereafter.

Brisbane, Jan. 30. —— RESIDENT.

GOLD MINING AS IT IS.

SIR,—In the report to be submitted to the shareholders of the Javali Gold Mining Company (Limited)—see *Mining Journal*, March 25—it states that, "Further samples of tailings have been received which, after passing through the whole of the reduction process, showed an assay value of 13 dwts. of gold per ton." The report gives the following return for three years ending 1875:—34 367 tons of ore crushed, the value of the gold from which realised 31,140*l.*

Can we be surprised that gold mining is looked upon with indifference and distrust when statements are made that tailings passing away from the reduction works contain 13 dwts. of gold to the ton, while the average value of the gold obtained during the last three years has been under 1*l.* sterling per ton of ore crushed? The wonder is that any gold should have been obtained, for in the *Mining Journal* of Oct. 16, 1875, we read that an assay of the tailings showed the loss to be 1 oz. of gold per ton. Again, in the *Mining Journal* of Dec. 18, 1875, we find that a second sample of tailings gave by assay nearly 1 oz. of gold per ton. And in the very same paper it is reported that in the month of October, 1875, 1500 tons were crushed, which gave an average of 4 dwts. 20 grs. of gold per ton. I am not aware that either of these statements have been questioned, therefore assume the facts are as stated.

Now, we will assume the loss of gold during the last three years to have been but 10 dwts. per ton only (the inference is, from what has already been stated, that it has been much in excess of this estimate—in fact, in 1875 it was stated to be over 1 oz. per ton). It will be seen that whereas the value of the gold sold realised a total of 31,140*l.*, the loss of gold must have been over 17,000 ozs., at a moderate estimate worth over 60,000*l.*

These figures show that "the real and substantial progress resulting from an extension of the reduction works," quoted in the report above alluded to, has been sought for without bestowing sufficient attention to the nature of the ore to be treated, and apparently quite regardless of the continued loss of valuable material passing away in the tailings, to work which a tailing-mill is now proposed to be erected. I have no hesitation in saying that whatever the character of the ore may be the great loss of gold would have been detected in the early stage of the company's operations had an assay office been on the works. On the other hand, if the ore was of an intractable nature not yielding a profitable percentage of gold by the method or process then in use the reduction works should have been suspended until a more effective system of extraction had been obtained, rather than continue the raising and crushing of thousands of tons of valuable mineral which, on account of the unsatisfactory manner in which it was treated, barely covered the expenses attending the operation.

It appears that the directors intend, "should the profit justify it," to send out a complete set of assaying plant. To those acquainted with gold mining it will scarcely be believed that the necessity of providing such appliances as soon as the works were established was not recognised. It is to be desired that some change should at once be made in the process at present in use for extracting gold, without which it will be hopeless, judging from the past, to anticipate any satisfactory results. With the adoption of a proper system of gold extraction large and profitable results should be obtained.

I should mention that I am neither directly or indirectly interested in the Javali Mine; and although my remarks have been especially directed to that company as one to serve for illustration, there are other companies which are in a somewhat similar position—in fact, in the report of a meeting of shareholders held in December last the Chairman is reported to have stated that they were losing 75 per cent. of the gold. It is for those interested to decide how long they can afford to continue such a system of waste, which increases the distrust generally attaching to mining enterprise.

It is with the view of endeavouring to remove the unfavourable opinions generally entertained respecting gold mining that has induced me to refer to the subject. And in a future communication I will, with your permission, endeavour to show that "gold mining as it should be" by known means in practical operation can (save in very exceptional cases) be made to return from 80 to 99 per cent. of the assay contents, depending on the efficiency with which the operations are conducted.—*Moorgate-street, March* 30. C. J. HARVEY.

THE CENTRAL SWEDISH IRON COMPANY.

SIR,—This company, launched in February, 1872, meets next Tuesday, to consider and, if approved, resolve upon the following resolution—"That the company be wound up." Verily it has had a short and uneventful life. It has been one regular "slope." First we have the Professor with his report (who paid his fee?); next the military; next the celebrated Mr. Bagnal, accustomed to the largest works, with his celebrated remarks on granite blocks and the feudal system; and now we have "this last." To quote again the words of the immortal Professor—"The figures speak for themselves, and require no further comments from me." It is as good as a play—only some honest people have contributed part of the 256,000*l.* which it is very mild language to say "has been lost." I commend the story to the "Writer of the Article," who advocates shipping Swedish ore. —— AN ENGINEER.

LINARES, FORTUNA, AND ALAMILLOS MINE.

SIR,—I was much interested in reading the account given of the above mines by "Observer" in last week's Journal, and have been induced to make some enquiries respecting these properties. As far as I can gather, the statements made by your correspondent are substantially correct; and it does appear that these mines are somewhat extraordinary in their character. I should have liked, however, a more lengthened description of the mines individually, so that one might be enabled to form an opinion as to their relative merits. "Observer" has, however, treated of them in general terms, so that I suppose we are to conclude that they are alike good. But what puzzles me is the disparity (in view of the interest paid) existing between the prices of the shares in the different companies. On referring to the Share List, I find that Linares is quoted at 5½, Fortuna 5½, and Alamillos 2¼; and these prices carry dividends of 10s., 8s., and 2s. 6d. per share, payable immediately. Your correspondent points out that at this rate Linares pays at the present market price 20 per cent., Fortuna 15½ per cent., and Alamillos 11¼ per cent. per annum. Now, assuming that there is equal prospect of these dividends being continued in each company, how is the apparent inconsistency in the prices of the shares to be explained? In other words, what keeps the price of Linares and Fortuna so low? If 11¼ per cent., which is paid by Alamillos, be taken as a basis (and I suppose this may be considered a good rate of interest even for a mine), the price of Linares shares should be 8*l.* 10s., and Fortuna 7*l.* per share. I shall feel obliged if "Observer" will endeavour to throw a little light on this. INQUIRER.

ECOMONIC STEAM AND COOL STOKE HOLES.

SIR,—Will you allow me to correct a slight error in your otherwise excellent notice of "Economic Steam and Cool Stoke Holes," in the Journal of March 18? You describe the iron jacket as being fixed over the cement at a distance of 9 in.; it should have been "so as to leave an air-way of 2½ in." I am obliged to draw your attention to this, as it might be a consideration with some steam users whether they could give a space of 11½ in. or 12 in. outside the boiler, particularly in the front, where gauge-cocks, &c., are fixed—a space of only 5 in. or 5½ in. being all that is necessary.

P. HARRIS HARE (Sole Agent for both Coating and Casing).

Staple Inn, Holborn, March 24.

SUNNYSIDE MINES, WEARDALE.

SIR,—Having received many letters asking for information respecting mining properties in this locality, I beg answers to such enquiries in general terms.

Nearly all the valuable districts—I use the word districts advisedly—are secured; for instance, such as one held by the London Lead Mining Company, and Mr. Beaumont, held for ages by grants from the Ecclesiastical Commissioners, which embrace not only nearly all the parishes of Walsingham and Stanhope, but occupy miles beyond. There are comparatively few small setts, of about 100 to 1000 acres. These are generally properties of resident freeholders, who know their value, and are exceedingly chary to whom and on what terms they grant leases. Nearly all these, I find, have been secured, and are about being worked.

The lodes are extremely erratic in their directions and sizes. Some, as the Harehope and Sharnbury veins, are great champion lodes, which have been opened on and successfully wrought at various points for distances of 12 or 15 miles. These frequently crop out to the surface of the width of 40 ft., and have been proved to considerable depths. The lodes, of which these are examples, are numerous, and run east and west, as a rule Numerous other veins, bearing some 12° to 20° east or west of north, are found, most of which are very rich for lead and blende ores in the upper strata, as well as in the lower beds.

I gave a section of the strata some three weeks since, which probably led to the communications referred to above. These have been wrought from the most remote times, and have produced millions of pounds worth of lead. Blende was until very lately wholly ignored. The Cornish Hush—one of the London Lead Company's Mines—sold last year upwards of 10,000 bings of lead ore, equal to 3500 tons, and have 20 carts continually engaged transporting ore from the washing to the smelting places. The Yew Tree Mine and several others are nearly as rich. Both these are on the north and south series of lodes, and have only been opened on in shallow workings.

Notwithstanding the enormous returns thus indicated, they exhibit no signs of falling off. The reason they are not more generally known, which I indicated in a former letter, arises from the ores not being ticketed for, and sold by private contract or in pig-lead.

Some small setts have been unwrought from the apathy, neglect, or inability of the owners; others from the well-known indisposition of farmers to have mining, however rich, on their estates; others, again, from family and cross purpose interests.

Some of the old grants are very curious documents. I saw one lately, dated 1741 (Dryburnside), which was a rather curious lease. At that time the mine was wrought by a few adventurers, mining companies being then unknown here. This property is a case in point of family interests, causing division. Another I have seen in which the dues were rated at 1-7th part. This completely prevented it being prosecuted for many years, the lords refusing the grant on the "principle my father adopted, and I will not prejudice my heir." Better counsels now prevail, and the property is at work, and affords convincing proof of the wisdom of the grantor.

The great success which has attended the Weardale district generally may be attributed to the continuous efforts and adequate capital employed, as well as the fact of the directory being vested in single practical parties, the managing agents being allowed to carry

out such suggestions as they may deem necessary, and not under a board subject to change and not thoroughly acquainted with the subject. They, knowing their situations to be permanent, exerted every effort to deserve their positions. They also knew the properties they were developing were not market or circular mines.

To those who have asked if there are any setts to be obtained, I reply I know of none. To those who ask are the mines really as represented, I say come and see, and beg them to do so before investing in such properties as are now on offer, and I think they will be satisfied by the advice of— GEORGE HENWOOD.

March 30.

THE LEAD MINES OF DERBYSHIRE—No. I.

SIR,—The lead mines of Derbyshire are situated in a tract of carboniferous limestone, about 30 miles in length from north to south, by a breadth of 10 to 15 miles measuring from east to west. The towns of Buxton and Castleton are at the northern extremity, Cromford and Wirksworth at the southern. This limestone is almost wholly surrounded by millstone grit and coal measures, and is usually separated from the grit by a belt of shale, adjacent to which, and sometimes in it, the veins are often rich in lead ore. The lead is not, however, found in the grit, as is the case in some parts of Yorkshire. The thickness of the limestone is very great, amounting to several thousand feet; it is not known what rock underlies it, no shaft having ever reached the base. The limestone consists of several beds, separated by thin layers of clay, locally termed "wayboards," which are useful as guides to the miners. Several beds of a kind of basalt, locally known as toadstone, are intercolated between the limestones; this toadstone usually cuts the vein completely off, though when sunk through the vein is again found beneath it; and, as many of the mines are worked by small partnerships of four or five miners, who work intermittently, meeting with these beds usually stops the sinking altogether. The thickness of the toadstone is very variable, sometimes only 10 or 12 yards, sometimes many fathoms. The two great hindrances to Derbyshire lead mining are a high rate of dues and the influx of vast floods of water at a certain depth. In that part of the county called the King's Field rather heavy dues are paid to the Crown; in a few parishes tithe on the ore is also paid to the vicar, and in some a royalty or composition is paid to the sough, or deep adit, which drains that particular district. J. B.

PROSPECTS OF CORNISH MINING.

SIR,—Whilst endeavouring to point out fair and legitimate mining speculations, it must be understood that among the many mines at work in Cornwall there are some destitute of the smallest chance of becoming productive selling at a good price as market mines, while some of those of real merit are quite overlooked; hence it is that the outside investor in the long run loses his money, and consequently puts the fault on Cornish mining instead of his own lack of discretion and proper guidance. He may take it for granted that the chances of success are ten to one in favour of new and unwrought ground, whilst in case of a failure the consequent loss is in the same ratio. In the richest copper district in England (Gwennap) there are yet pieces of unwrought ground traversed by mineral veins of untold wealth, throwing off the unmistakeable gossan known to ride the great copper deposits of the district. Public attention is again being attracted to it. The writer has a section of ground about to be opened (by his clients and friends without any promotion money) skirting the well-known granite range of Carn Marth, to the east and west of which the same veins have produced more mineral wealth than any other district in the county, and analogy points to equal success.

As a proof that new ground pays the investor best, take for instance the Devon Great Consols, a virgin piece of ground, requiring only a limited capital to test its worth, when before 1024*l.* was spent the great and well-known deposit of copper was struck, which gave the shareholders a profit of 80,000*l.* the first year. Again, South Caradon, West Caradon, Fowey, and Par Consols, the amount expended before the discoveries was comparatively insignificant, and so sure as attention is again paid to this kind of mining so sure will there be profitable mines discovered; probably the greatest amount of money made in Cornish mines has been out of those around the celebrated Carn Marth and Carn Brea ranges of granite, and a continuance of which may be expected from the development of the unwrought ground still existing. I find from Grylls's Annual Mining Sheet for June, 1838, to June, 1839, the mines around Carn Marth sold copper ore to the value of 358,371*l.*, which says more for the value of unexplored ground in the district than to monopolise the whole space of your valuable Journal. CHAS. BAWDEN.

St. Day, Cornwall, March 30.

BRONFLOYD MINE, AND ITS MANAGEMENT.

SIR,—Having had an opportunity to inspect this mine, I wish to lay a few particulars before the shareholders, and with your kind permission will do so, as follows. I need not give them the history of the management and affairs generally during the last four years since Capt. Kemp left, as they are, no doubt, fully aware that gross mismanagement and reckless expenditure almost ruined the mine, and destroyed their faith and hope in it ever coming to anything good again. Such management and conduct as have been applied to the mine and its affairs cannot be called mining, and should be strongly condemned by those who wish to see mining prosper, and prosecuted for its own legitimate ends. Our county of Cardigan is made a regular means of such transactions until mining here is almost always looked upon as some sort of swindle or other, leaving men who are really honest and desirous to do their duty for their employers with nothing to do but follow the usual course, or starve.

Before my inspection I for one was firmly of opinion that Bronfloyd was an exhausted mine, a poor worked-out "bal," which would very shortly be brought under the auctioneer's hammer; and I concluded thus from the fact that the samplings had come down very low, and that but little, if any, profits had been made during the period before mentioned. But some of the shareholders had not lost faith in the mine, or were better informed than I was, and to give it a chance they set about clearing the mine of incumbrance in the shape of debt, bad management, &c. They have also appointed Capt. Kemp to his old post again. It may be here remarked that Capt. Kemp made nearly all the profit that has been made at Bronfloyd, the last year of his management having yielded 4000*l.* in dividends. And I am of opinion that the directorate have taken a wise step in his re-appointment, for he has already taken steps which will ultimately restore the mine to its former position as a dividend-paying concern. Samplings will shortly be raised to 30 tons per month, and reserves are being gained rapidly; 20 men are stoping slightly more ore than is being sold; the 94 is being driven west in a very good lode, and the 104 is opening out in a splendid lode, which, without fail, will fully equal anything seen in the mine before, which is saying a great deal. It has now been extended 10 fms. west from the main engine-shaft, or No. 3, and in all probability there is fully 20 fms. more before it in this one run of ore ground, as it has been proved that the "big bunch," which was only 15 fms. long in the shallower levels, is gradually extending as depth is attained, and may with confidence be expected to reach 30 fms. long in the 104; this is a most important and valuable feature, and when it is considered that the lode is fully 6 fms. wide, carrying ore from wall to wall, this 30 fms. are equal to 200 fms. long of a lode of ordinary width. Other points of interest are being prosecuted with vigour, notably the 52 west, on Middle lode; a good course of ore can be expected here at any time, as the end has a most kindly appearance, and is about parallel to the great bunch above referred to on the north or main lode. Should expectations be realised at this point the value of the mine would be enhanced exceedingly, as it could be wrought by means of cross-cuts, &c., from the present engine-shaft and workings on the north lode with very little cost for tutwork. A great advantage is the very small feed of water to contend with, a 5-in. plunger keeping the mine in fork, and the shaft can be sunk with barrels easily. The No. 3 is a fine engine-shaft, but the winding apparatus is very defective, and quite inadequate for such a mine as Bronfloyd. There should be power for dealing with four times the stuff now dealt with. Capt. Kemp is fully alive to this fact, and has, I believe, consulted with the directors with a view to fixing a skipway in the shaft, and erecting a new water-wheel, with powerful winding machine attached. It is also contemplated to call in Mr. George Green, of Aberystwith, to make certain alterations and improvements to the dressing machinery on his now well-known patented system, which certainly will effect a constant saving in ore and labour. MINER.

BRITISH MINING VERSUS BRITISH UNDERMINING.

BRITISH MINING, DOES IT PAY?
BRITISH UNDERMINING, DOES IT PAY?

SIR,—The above text will afford scope, we hope, for some future discussion, and to such discussion the writer of this article stands pledged to the extent of his capacity, and only hopes, if discussion be elicited, that such discussion may be conducted with proper feeling. Many of your readers have heard of British mining, but the word undermining is one little known (but severely felt), and as minerals are still needed, and while such minerals are needed there must be mining, and it is possible the time may arrive when undermining may be less known. It is the object of the writer of this letter, and of which this is his first part, to explain as near as possible the difference between the terms mining and undermining, and in the introduction of the subject to-day, he only intends to say that mining pays well were it properly conducted, and the money spent in wages, with right and proper pay to management. Thus mining is a good investment, as can be proved.

The genuine sovereign has caused the manufacture of a counterfeit, but this is not so great an evil as the under-mining business of the present day; and, while outside shareholders are informed that not one-third of the money raised for mining in the last four years has really dropped into the hands of the working miner, including the working captains, that is in new companies, the general investor will not be surprised at his money being lost, seeing that he is in the hands of the underminer. It is desirable to have short paragraphs, as no one likes long lectures; and in next week's Journal I hope to introduce a few words on the underminer. Meanwhile, I trust, for the benefit of that most important industry, some good may accrue, although introduced by— T. VOSPER.

48, *Finsbury-circus, London, E.C.*

GOLD IN WALES—No. XXIV.

DOLGELLEY DISTRICT—TWDDYNGLWADIS SECTION *(continued)*.

TWDDYNGLWADIS MINE *(continued)*.

A purely accidental circumstance on my part made this district an object of interest to palæontologists, by the discovery in May, 1864, of a tolerably perfect specimen of the *Paradoxides Davidis* of Salter, which from the back of a Welsh pony I asked Mr. E. Williamson, who was walking by my side, to pick up for me. This he did. I did know that it was a species of trilobite, and that was all. "My thoughts on other matters ran." They were mineralogical, and in such thoughts (acquired at my home) Mr. Williamson was faithfully attached to me. He sent, however, a sketch of the fossil to Mr. Plant, F.G.S., of Salford, and in the interests of palæontology I have much pleasure in reproducing a paper read by Mr. Plant, F.G.S., at a meeting of the Manchester Geological Society, Jan. 31, 1865:—

DISCOVERY OF PARADOXIDES DAVIDIS AT TYDDYNGWLADIS.

BY JOHN PLANT, F.G.S., ROYAL MUSEUM, PEEL PARK, SALFORD.

The trilobite paradoxides, perhaps known to Linnæus in 1753, was first described by Brongniart in 1822, who placed it in his first division of trilobites—those incapable of rolling themselves into a ball; the division includes several genera, all of ancient geological date. The trilobites, of which paradoxides is a prominent species, are distinguished by the structure of the lateral lobes of the body, which preserves the same breadth, without diminishing towards the upper end and external side to wards the margin, in the smallness of their elongated and depressed eyes, and in other characters, which present differences of genera and specific value.*

Paradoxides has been unknown to belong to British strata till within a very recent period—if we except the solitary figure in Murchison's "Siluria," name *P. Forchhammeri*, which was found in North Wales some years ago, by Mr. Selwyn, in what locality has never been known, but the species are common enough in the beds of Lower Silurians, forming the Primordial Zone of Barrande in Bohemia, and in the Taconic system in North America.

In 1862, Mr. Salter, the able palæontologist, when on a visit in Pembrokeshire, South Wales, examined the Cambrian and Lower Silurians, in the vicinity of St. David's, and had the good fortune to find, in a thick mass of black slates and shales, fragments of paradoxides: and in 1863, with the assistance of several local geologists, and Prof. Griffiths, of Liverpool, the locality was diligently searched, and the result was the discovery of many fine specimens of a new and g gantic species of trilobite, which Mr. Slater has named paradoxides davidis, together with other new forms, figures and descriptions of which have appeared in the "Geological Journal."†

In May, 1864, I received a communication from my former pupil in geology, Mr. Ezekiel Williamson, then employed at the gold mines at Cwmheisian, Merionethshire, enclosing a sketch of a fossil which had been accidentally found by Mr. T. A. Readwin, F.G.S., a member of the Manchester Geological Society, near the locality of the Tyddyngwladis Mine. I recognised in the sketch a portion of paradoxides, and advised Mr. Williamson to make a careful search in the neighbouring slates for the bed from which the specimen had probably been washed out. In July Mr. Williamson himself found another specimen lying loose on the hill. These two specimens were seen soon after by Prof. Rupert Jones, Professor Ansted, and Mr. Salter, and by them recognised as undoubted paradoxides.

From these discoveries it was evident that the fossils were indigenous to the slates near the mines, and Mr. Williamson commenced a very careful search in the exposed slates just over the silver-lead mine at Tyddyngwladis, and soon after found several fragments of spines, body rings, cephalic shields, and long spines enclosing the tail lobes. Encouraged by his success he worked indefatigably for several months, and procured a considerable number of specimens, many fragmentary, but a few nearly perfect, of the giant paradoxides.

The publication of Mr. Salter's memoir in the "Geological Journal" renders it unnecessary to enter into a minute description of these specimens, as it is acknowledged by Mr. Salter that many of them are identical in specific character with those figured by him from St. David's; but there are many fragments in the specimens found at Tyddyngwladis which bear no resemblance to the figures, and t ese upon further examination may prove to be new or undescribed trilobites. All the specimens found at Tyddyngwladis are much broken by the numerous jointings, which have dislocated the slates into rude cubes from 2 in. to 12 in. in size.

The geology shown in the section has been prepared by careful measurements through the adit of the mine, and by the outcrops on the hill. It differs considerably in its detail from the section, No. 37 of the Geological Survey, although the line of each section is nearly coincident; but Mr. Williamson has the chance of being the most correct, from the advantages afforded to him by his constant labour at the mine for more than two years; every yard of the strata in the mine and on the hill has been measured and examined with great care many times over. The strata are faulted in every direction, and partially obscured by the occurrence of interbedded and eruptive traps, but the Tyddngwladis strata be ar a close an alogy to Cambrians and the Silurians, as exhibited in the section of St. David's, by Mr. Salter in the "Geological Journal." The general section is about 11 miles in extent, commencing on the west at Llanbedr, and extending to the hill on the east called Moel Hafod Owen. To the westward are thick masses of coarse red and purple grits forming the Cambrian base; these roll away towards the coast in a succession of mountainous ridges, the slopes of which are strongly marked by glacial action, the valleys blocked up with morains, worn boulders, *roches moutonnee*, perched blocks, and other evidences of great glaciers. Resting upon these Cambrians grits, near Tyddyngwladis, are beds of slate, without cleavage, more or less striped with cinder and ash deposits, with interbedded felspathic traps, the total thickness being 1136 ft. In the valley of the Mawddach a deep fault occurring renders the true succession of the immediate strata doubtful, but on the rising ground to the east the beds are well displayed in the o ntcrops, and were measured at the base in the adit of the mine. These strata form a series of hard grey striped slates and waxy grits, at present unfossiliferous, with ir regular bands of felspathic traps partly interbedded, and partly intrusive. Upon these, forming the commencement of the Lower Lingula flag series, rests a great thickness of altered felspathic sandstones, with a bed of quartzite. This series is locally named the Cwmheisian flag.

The strata, counting from the first bed of slate over the Cambrian grits, as far as the base of these Cwmheisian flags, form a distinct primordial zone, containing fossils, such as theca, paradoxides, anopolenus, of older type than those which are found in the strata lying above the Cwmheisian flags—lingula, Olenus. The order and thickness of the beds displayed in the section west of the valley are as follows:—

Thick beds of coarse red and purple grits	Cambrian	
Hard slate, filled with ash and cinder deposit	Ft.	119
Felspathic trap		40
Hard slates, with fewer ash and cinder lines		75
Felspathic trap		165
Slates finely bedded, without ash (anopolenus and theca)		217
Felspathic trap		198
Slate of a softer nature—dark, grey, black (paradoxides in abundance, and a few theca)		150
Felspathic trap		132
Total thickness	Ft.	1,136

There can be no doubt that further discoveries will be made in other localities in North Wales now that the relation of these strata has been made known, and that along the line of super-position of these lower Silurians, or upper Cambrians (whichever they are claimed to belong to) over the true Cambrian purple grits, the slates will be found to be rich in fossils of a primordial type, but until there is a taste for geology, and a love of observing and collecting diffused amongst the workmen at the mines, such discoveries will be few and of little value. In this same mining district of Tyddyngwladis the adit of the mine and shafts had been driven through the slate abounding in paradoxides for years, and tons of waste tumbled into the river, without the discovery of a single fragment of this interesting fossil by the ignorant agents and miners; but through the intelligence of Mr. Williamson, a young miner, who had acquired a knowledge of geology at the Salford Working Man's College, this valuable discovery in palæontology has been given to science, and the locality will become a favourite one to the field geologist. The sections accompanying this paper show the general relations of the formations from the coast at Llanbedr to Moel Hafod Owen, about 11 miles, and in No. 2 the hill at Tyddyngwladis, with the position of the slates bearing fossils. No. 3 is a sketch of one of the specimens of paradoxides, and the mollusc theca.

* Barrneister Organisation of Trilobites—p. 55, tab. 1; fig. 5.

† Quart. Journ. Geol. Soc., 1863, p. 274; 1864, p. 233.

MEMORANDUM.—Assays of lead ores by Mr. F. Bennett, at Bagillt, June, 1865—

	Lead p. ct.	Silver.		Gold.	Value.
No. 1.—Coarse, Cwmheisian lode ...	75	4 oz.	16 dt.	nil.	£13 15 0
„ 2.—No. 4, handwashed	63	50	12	1	19 5 6
„ 3.—No. 1 jigger	70	44	16	—	—
ditto	—	32	16	traces.	20 10 0
„ 4.—No. 2 jigger	66	53	0	—	—
ditto	—	37	0	1	21 5 6
„ 5.—No. 3 jigger	55	45	0	—	—
ditto	—	—	—	1	15 18 6
„ 6.—No. 1, handwashed	78	50	0	—	—
ditto	—	40	0	2	14 1 6
„ 7.—No. 2, handwashed	78	50	0	—	—
ditto	—	40	0	2	24 1 6
„ 8.—No. 3, handwashed	66	50	0	1	21 2 6
ditto	—	35	0	—	—
Sample lead	—	48	10	—	32 2 6

Mr. E. WILLIAMSON (June 30, 1865) reported: "Since the general meeting no important discoveries have been made. The mine has been worked for silver, lead, and blende. After the usual spalling, picking, and crushing, the ore has been dressed with more than ordinary care, and every means at our command have been used to prevent the great loss of lead, and the almost total loss of the silver contained in the undressed ores. The richest ore, when spalled and picked, usually contains 8 to 10 per cent of galena, and, on an average, 20 ozs. of silver, and 12 dwts. of gold to the ton. This, when dressed, yields about 75 per cent. of galena, which contains nearly 70 per cent. of metallic lead, 50 ozs. of silver, and 12 dwts. of gold to the ton. From this it is clear that nearly all the silver is lost during the dressing. It may be seen floating and glistening on the surface of the water as it passes through the slime pits during the dressing operations, and with present appliances its escape cannot be prevented. If the silver was equally diffused through the galena (as is ordinarily the case), such a large loss of silver could not occur without a correspondingly large loss of galena: this not being the case here, the main bulk of the silver must exist in some mineral other than galena. This has been found to be the case, and as aphtonite (the mineral alluded to), found in No. 4 stope, will give 9 per cent. of silver, there can be no doubt that aphtonite and a few other minerals of the same class, give nearly all the silver that is found in the lode, and that the galena itself in mass is not so rich in silver as was supposed. It would appear that the usual mode of treating these minerals must result in the loss of nearly all the precious metals, and the baser metals are not at present found in sufficient quantity to pay for working by themselves. If amalgamation can be improved by the use of sodium, as appears likely by Mr. Crooke's experiments, which I have seen lately at Gwynfynydd, it will, of course, make an important alteration, as lead ores now cannot be effectively amalgamated. Ores sufficiently rich for working are now standing in the stopes Nos. 1 and 4 in the deep adit, and blende which is occasionally very rich in gold is to be got from the great slope that communicates levels 2 and 3. By reference to the section I have prepared, the run and extent of the ore ground can be seen. There is standing on the stopes an immense quantity of lode, which, as far as can be seen in Nos. 1 and 2 adits, is of an average quality."

MEMORANDUM (Aug. 21, 1865) received by Mr. Bennett at Bagillt: Lead ores—first lot, 1 ton 18 cwts.; second lot, 2 tons 12 cwts.; third lot, 15 cwts.; fourth lot, 14 cwts.: total, 5 tons 19 cwts., which gave 1 ton 2 cwts. 2 qrs. 15 lbs. of metallic lead, at 19*l.* 5*s.* = 21*l.* 5*s.* 8*d.*; allowed for silver, 4*l.* 7*s.* 6*d.*: total, 26*l.* 3*s.* 2*d.*

Mr. BENNETT (Aug. 23, 1865) wrote Mr. Readwin—"The following is the result of smelting your lead ores:—From the lead furnace we have 17 cwts 3 qrs. 11 lbs. lead, with 88 ozs. silver to the ton of lead. From the slag lead we have 4 cwts. 3 qrs. 4 lbs. lead, with 34 ozs. silver per ton."

Mr. BENNETT (Oct. 18, 1865) wrote Mr. Readwin—"The lead I sampled and sold at Bagillt to A. Eyton contained about 100 ozs. silver to the ton, and you will remember that the sale was at 43*l.* per ton."

Mr. T. WILLIAMS, of Bagillt (Oct. 27, 1865), wrote Mr. Readwin—"I have melted the metallic lead, which weighs 39 lbs. I took 2 ozs. of the lead for an assay. I enclose the produce of silver, also the gold, that was obtained from 3 ozs. of the lead. There remains 58 lbs. of slag, which consists of iron, zinc, copper, silver, gold, and 21 per cent. of lead. I enclose you the product of silver from ½ oz. of the lead."—MEM. Found this experiment satisfactorily in accord with my own.

Mr. Readwin's report to the directors (Dec. 21, 1865): "Gentlemen,—You expect me, as a matter of course, to give an account of the present position and prospects of these mines. This is a very difficult task, and one that cannot be done in a few lines. Perhaps it would be impossible in this country to find a greater geological puzzle than Tyddyngwladis. I have taken counsel with gentlemen of the highest repute as geologists and miners, nearly all of whom express their belief in the existence here of large and important metalliferous deposits. I have devoted so much time and labour to the consideration of this subject, without coming to a satisfactory conclusion, that I frankly confess myself at the present time unable to advise. The mine, as it appeared to me, having been opened in a very systematic manner, and rather extensively, without the anticipated results, I determined at my own cost to employ one of the most eminent geologists of the day to make a complete examination of the district, in order to discover, if possible, the cause of our want of success, and whether further explorations were advisable or not. For this purpose I selected Mr. Salter, of the Government School of Mines, with whom I went carefully over the ground, pointed out to him the principl peculiarities of the locality, and placed in his hands my maps and memoranda. These details were afterwards daily supplemented on the spot by the company's intelligent agent—Mr. E. Williamson. An abridgement* of Mr. Salter's report is appended, and, in order that it may be better understood, I may observe here that the fissures in the earth's crusts are called faults, and that it is in these faults mineral matter has been deposited. A district without faults is either poor in or destitute of minerals. Flintshire is full of faults, and is just as full of minerals. Tyddyngwadis has faults running in all directions. To find and map out these faults, the direction they take, and the accidents by which their courses have been changed, or the faults thrown, as it is called, by other faults, was the object of enquiry, so that time and money might be saved in the search after the desiderated metallic deposits.

To effect this thoroughly it was obviously essential to obtain definite knowledge as to the stratification and the order of succession of the various beds of the entire district, and of their numerous dislocations. Surface appearances, of course, are taken into account for what they are worth, and at times are of great importance, but it is not expected that they will be always the surest guides in the direction of mining operations. For where this is alone done superficial strings and courses are often followed, where the main fault (probably richer in the mineral sought for) is covered over with accidental matter, such as river deposits, swamps, &c. It was, therefore, in the Tyddyngwladis paradox a necessity to study closely the geological structure of the locality, in order to arrive at a knowledge of the general direction of its principal faults, and their relation to each other, so that when favourable indications are discovered analogous to productive conditions in other localities the shortest and least expensive mode of reaching them might be determined on.

As I am very largely interested in what is called the Dolgelly district I requested Mr. Salter to take at first a wide field of observation, and to apply the knowledge he would acquire to the Tyddyngwladis locality especially. Mr. Salter devoted a couple of months of hard work to the subject on the ground. I have only received his report a few weeks, and it has been in active circulation ever since among mining men, for the purpose of getting Mr. Salter's opinions confirmed or otherwise. I have had a great deal of correspondence upon the subject, without, I regret to say, any proportionate benefit. All recommend the mines to be thoroughly worked, but do not coincide in opinion as to the precise direction of the explorations that should be made.

Appended is Mr. Williamson's (the agent) report of work done by him. I have great pleasure in saying that Mr. Williamson, during his agency, was most untiring in his energy, and has worked out the details of the mines very elaborately, as his report and sections will testify. The general opinion is that the Tyddyngwladis mines are very valuable for lead and silver, and in that opinion I concur: but, under existing circumstances, I should be very reluctant to take upon myself the responsibility of advising any particular mode of working them, although, if the mines were my own, there is a plan of operation which I should unhesitatingly pursue, and take my chances of success. The ore-dressing operations fell much short of what was expected. This Mr. Williamson partly accounts for. The ore is occasionally very rich indeed in silver, and contains some gold. Both these metals escape, I believe in the way he mentions: but the quantity of lead ore obtained is very small, although some of it, notwithstanding the loss referred to, contained when it arrived at Bagillt as much as 53 ozs. of silver to the ton, and the pig lead produced therefrom as much as 88 ozs. to the ton, and a few pennyweights of gold not taken into account. The most remarkable feature, perhaps, is the discovery of a small vein of silver ore, containing at times as much as 9 per cent. of silver. It is not at all unlikely that if this string of ore was followed up it would lead to a larger deposit."

Directors' report, Dec. 21, 1865: Your directors regret their inability to report favourably of the present position and prospects of the mines. It will be seen from the statement of accounts that the receipts have been 581*l.* 15*s.* 4*d.*, and the expenditure the same amount. The liabilities 543*l.*, and available assets 33*l.*, with 575*l.* of capital not called up. The operations at the mines, as far as they could be carried on with the limited funds at command, did not produce the favourable results expected, owing to causes explained in the reports. A great amount of work has been done at the mines at different times in directions that were thought would lead to remuneration. The results up to the present time have not so proved. Mr. Readwin, who has gratuitously given much time and labour in endeavouring to discover the cause of non-success, employed at his own cost Mr. Salter, the Government geologist, to examine the whole district thoroughly, and report thereon. Mr. Salter's elaborate report and sections Mr. Readwin places at the company's service, although he frankly states his inability to advise confidently with reference to future operations at the Tyddyngwladis mines.

In order to carry out explorations economically, under one agency, &c., it was proposed to amalgamate this company with the Cwmheisian Company, but the proposition was not favourably entertained by the shareholders. The general meeting had been postponed from time to time at the suggestion of the Chairman, in the hope that more definite data would be obtained, both as to what work should be done at the mines, and the mode of dressing the ores, upon which the company could take action with a reasonable expectation of good resulting therefrom. In acceding to this your directors thought, under the circumstances, they were consulting the interests of the shareholders. It is obvious, therefore, that some decision ought to be come to, either to work the mines or wind up the company.—Signed, HUGH FLEMING, Secretary. T. A. READWIN.

March 29. *(To be continued.)*

* Mr. Salter's report has been published in this series of letters *in extenso*.

PENNERLEY MINE.

SIR,—On March 18 I received a circular from the secretary of the above mine, dated March 17, pointing out certain improvements that had taken place in the same; he might have saved himself the trouble and the shareholders the expense of printing and postage, for on the same day appeared in the *Mining Journal* the same news. Now, I should like to call the attention of Pennerley shareholders to the following dates and facts: The first intimation I (a shareholder of four years' standing) received was on the 18th, the agents' report was dated the 15th; but the shares rose 12*s.* 6*d.*, 7*s.* 6*d.*, and 12*s.* 6*d.*, on the 11th, 13th, and 15th respectively; consequently the improvement must have taken place and been known to certain parties at least four days before the agents sent in their report, and seven

days before I knew anything about it. To use the mildest terms, there is serious blame to be attached to some one. Shareholders—and they only, in the first instance—should have been informed simultaneously (as far as postal communication would admit) of any improvement that had taken place. I can hardly think that I am the only one that has been left out in the cold; if not, I trust some shareholder who understands the *modus operandi* will take some action in the matter. By mismanagement, if nothing worse, our mine may come to ruin, as West Chiverton nearly did about 18 months ago, but was saved by a few energetic shareholders who turned out the old managers, and raised the mine from the verge of bankruptcy to a dividend-paying state; and the shares, which 18 months ago, were less than 1*l.*, are now worth 20*l.*

A SHAREHOLDER.

[For remainder of Original Correspondence, see to-day's Journal.]

Meetings of Public Companies.

ECONOMIC LIFE ASSURANCE SOCIETY.

The annual general court was held at the offices, New Bridge-street, Blackfriars, on March 25.

The Right Hon. E. P. BOUVERIE in the chair.

Mr. J. R. GRIMES (the secretary) read the notice convening the meeting, and the auditor's report. The statement of accounts was taken as read.

Statement of Accounts for the year ending December 31, 1875.

GENERAL ACCOUNT.—RECEIVED.

Assurance premiums				£219,952	4	8
Less commission				7,354	12	4= £212,597 12 4
Interest on investments				127,383	5	8
Less income tax				1,048	7	3= 126,334 18 5
Registration fees						55 0 0
Ready money bonus refunded						29 10 0
Total						£339,017 0 9

PAID.

Assurance claims						£229,366 0 0
Annuity claims						1,850 0 0
Policies purchased						9,901 18 2
Re-assurance premiums						334 16 4
Office expenses						10,986 12 0
Law charges						529 1 1
Medical fees						301 7 0
Balance carried to investments						85,757 6 2
Total						£339,017 0 9

ASSURANCE FUND.

Dr.—To balance, Jan. 1, 1875, consisting of—				£339,309	15	0
Funded property				2,148,068	8	2
Mortgages				145,904	4	0
Loans on policies				96,189	8	7
Reversions				68,783	3	3
Life interests, &c.				26,916	5	6
Office premises				155,297	14	3 = 2,930,468 18 9
Cash on hand and on deposit						12,370 17 5
Profit on reversions fallen in						85,757 6 2
Balance from general account						£3,078,597 2 4
Total						£ 559 12 8
Cr.—By terminable annuities, &c.						
Balance, December 31, 1875, consisting of—						
Funded property			£	356,461	7	4
Mortgages				2,332,334	3	6
Loans on policies				149,222	5	4
Reversions				73,030	9	9
Life interests, &c.				71,587	16	3
Office premises				27,118	13	4
Cash on hand and on deposit				68,282	14	2 = 3,078,037 9 8
Total						£3,078,597 2 4

STATEMENT FOR THE YEAR 1875.

Number of proposals received			483
For which policies were issued	386		
Declined	62		
Not completed	35 =	483	
Number of policies remaining in force at end of year			9960
Amounts assured thereon	£8,125,089		
Absolute bonus remaining	970,248		
Total liabilities		= £9,095,337	0 0
Sums assured by new policies		290,315	0 0
Amount of new premiums		10,349	3 4
Total premium revenue		225,467	0 1
Assurance fund		3,007,893	11 6
Total income		354,969	15 7
Average rate of interest per cent.		4	7 7

STATEMENT OF CLAIMS ACCRUED.—On 274 policies assuring 210 lives in the sum of 288,195*l.*, including bonus. Out of the 274 policies determined by death, 258 assuring 215,348*l.* carried 65,147*l.* bonus, averaging 30¼*l.* per cent. on the sum originally assured, irrespective of the bonuses received in each or reduction of premium on the same policies.

The CHAIRMAN regretted that Mr. Barnett, the Chairman of the Society, was not present to fill the place he always occupied so worthily, but at present Mr. Barnett was on the Continent. He regretted that Mr. Barnett's mantle should have fallen upon one so much less capable than he to discharge the duties of Chairman. In the accounts for the past year there was no feature calling for special observation. The business had been carried on in the ordinary way, and the amount insured was, although not so great as could be desired, yet, on the whole, satisfactory. Suggestions had been made at previous meetings that, with the view of extending the society's operations, endowment assurance tables should be prepared, in order to enter into that class of business, which hitherto they had eschewed. The board felt that as some of the other important and respectable offices took that class of business persons might be induced to insure with this society if the opportunity were afforded. Acting upon this idea their able actuary, Mr. Fisher, had, after a great amount of labour, prepared a number of tables for the purpose of enabling persons to assure upon the principle of endowment assurance, and these tables would very shortly be published. The policies in force on December 31 were very nearly 10,000, or 9960. At the end of 1873 they were 9812; at the end of 1874 they were 9979, so that they had rather more policies than there were in 1875, and rather fewer than there were in 1874. The 9960 policies assured the sum of 8,125,000*l.*, carrying bonuses of 970,000*l.*, and yielding in annual premium income 220,000*l.* There was a deduction to be made from that of bonus values of 5863*l.* outstanding. The assurance fund on Dec. 31 amounted to no less a sum than 3,008,000*l.*, showing an increase on the transactions of the year, after providing for claims accrued but not paid, and other items not taken into the auditors' statement, of 40,800*l.* The average rate of interest yielded by the investment was 4*l.* 7s. 7d., being a decrease, he was very sorry to say, of 11d. per cent. as compared with 1874. That induced him now to call attention to the extraordinary general court, of which notice had been read, and he thought it was just as well that he should now give their reasons for convening that court, and the resolutions to be submitted to it. The fact was there had been a general decline in the rate of interest. Securities of any real value, carrying a fixed rate of interest, had all increased in capital value, so that the general current rate of interest in England, and indeed throughout the world, was decreasing. This society was affected by that as well as other people who had money to lend, because they could not get their money out at the same rates as they had in former years; the consequence was that for the last three years the average rate of interest on their investments had been on a steady but small decline. He had the figures which the actuary got out for him, and he would read them:—In 1872 the average rate was 4*l.* 9s. 5d. per cent.; in 1873 it was 4*l.* 9s. 4d. per cent.; in 1874 it was 4*l.* 8s. 6d. per cent.; and in 1875 it was 4*l.* 7s. 7d. per cent., so that it had gone down 1s. 10d. per cent. between 1872 and 1875; and, as far as they could conjecture, although perhaps it would be rash to speculate about what would be the rate of interest for the future, looking at the commercial world there was no probability of there being any great rise in the market rate of interest for some time to come. On a previous occasion it was found desirable to alter the very narrow limits of the Deed of Settlement, with the view of enabling them to extend the investment clause of the deed, which was framed at a time when there was a less variety of investment than at present. Some time ago the members gave their consent to the investment in debenture stock, and in the debenture stock of the East Indian Railway Company guaranteed by the Government. There were debentures or bonds of public bodies incorporated by Act of Parliament which were eligible investments for insurance companies, and with the view of enabling themselves to take advantage of such investments, it was about to be proposed to extend the investment clause of the deed. As regarded the general business in the last year, they had issued 386 new policies, assuring 290,000*l.* That on the whole was satisfactory, though not so large as they could wish, but was better than the average of the past four years. The society seemed to be recovering itself, and there was no reason why they should not, if they made every effort, as they wished to do, and endeavoured to do, to legitimately extend their business, recur to the same large figures of new business which some years ago they were able to present. Having stated that he would be happy to answer any questions, he moved that the statement and report be received and entered on the minutes.

Mr. G. K. RICKARDS seconded the proposition.

Mr. WILD asked upon what rate of interest the calculations were based?

The CHAIRMAN: 3½ per cent.; they were well above that.

Mr. SEAL invited the Chairman to give some comparison with regard to the accrued claims.

The CHAIRMAN replied, that in 1875 274 policies, assuring 288,000*l.*, accrued, whereas in 1874 192 policies, assuring 157,000*l.*, fell due. According to the actuary's calculations 259,000*l.* was the amount expected to fall due in 1875, being 29,000*l.* less than the actual amount claimed; on the other hand, in 1874 the number of policies which fell due was 192, against 222 calculated, and the amount paid under the calculation was 80,000*l.*

Mr. SEAL asked how the figure "229,336*l.* assurance claims" was arrived at?

The CHAIRMAN replied that that figure was the actual amount paid in 1875, but a certain number of claims which had accrued in that year had not yet been paid.

Mr. SEAL: Then I take it that the difference between 229,336*l.* actually paid, and 288,195*l.* claims accruing in 1875, consists of those policies which have accrued, but which had not been paid up to the day of the account.

The CHAIRMAN: Yes.

A MEMBER: I presume the 229,336*l.* includes claims which accrued in 1874, but were not paid until 1875?——The CHAIRMAN answered in the affirmative.

Mr. HUMPHRIES asked the Chairman to state the respective amounts of claims outstanding? to which the Chairman replied, 81,800*l.* in 1874, and 140,000*l.* at Dec. 31 last.——The CHAIRMAN said the number of policies remaining in force at the end of 1875 was 9960, as against 9979 in 1874, and 9812 in 1873. The item 1850*l.* annuity claims included 760*l.* for office pensions.

Mr. DENMAN thought the 7354*l.* commission should appear as a payment, instead of as a deduction from the receipts.

The SECRETARY said the accounts had been made out in their present form for more than 40 years.

Mr. DENMAN pointed out that if the commission appeared among the expenses, the working expenses would be 9¼ per cent. instead of 3½ per cent.

Mr. WILD thought the commission was a proper deduction from the receipts; it was not an expense.

The CHAIRMAN did not consider the matter very material. The total expenses of management, including commission and income tax, were 21,319*l.*, or about 6 per cent. of the total income. If the amount paid for income tax were excluded the working expenses would be 9 per cent. on the total premium income only.

A MEMBER said it had been stated out of doors that it was the intention of the board to reduce the commission. Now, as long as human nature lasted, and he supposed it would continue some time yet, persons would take their business to the office which paid them best for it.

Mr. MITCHELL said the accounts had always been submitted as now, and always satisfactory, and to suggest an alteration was only casting a slur on the board.

The CHAIRMAN, in reply to further observations, said that in 1870, when there was such a great condemnation of insurance offices giving such heavy commissions, the directors of this Society felt it to be their duty to reduce its commission, and he suspected a portion of the decline in the business was due thereto. Experience showed it was a doubtful policy, although it was in conformity with general opinion at the time, and adopted by some of the most important offices in the kingdom. The Economic Society depended for a considerable portion of its business upon volunteer assistance—for bringing it a bounty had been paid. A handsome commission was an effective stimulus in bringing business, but the effect of the reduction of bounty was now passing away.

The statement and report were received, and ordered to be entered on the minutes.

The auditors were re-elected, and the usual award voted.

An extraordinary general court was then held.

The CHAIRMAN moved that the moneys of the society not required to satisfy the immediate claims upon and the expenses of the society may be laid out and invested upon the security of lands in Great Britain or Ireland, or in purchasing, or on the security of the policies or bonuses of the society, or the public or Government securities of Great Britain or Ireland, or India (or of any British colony or possession, or the public or Government securities of or on loan to any foreign Government where such securities or loan are under the guarantee of the Government of the United Kingdom), or on the security of any other property heritable or moveable, real or personal, in possession reversion or remainder, within any part of Great Britain and Ireland as to the directors shall seem right and proper, or upon security of any rates tolls, or other property arising and being within the United Kingdom, or on the mortgages, or bonds, or debenture stock of any company of the United Kingdom (incorporated by Royal Charter or special Act of Parliament) paying dividends on their ordinary shares or stocks (or on the bonds or debentures of any board or commission or other public body incorporated in like manner, or on the shares stock, mortgages bonds, or debenture stock) of any company guaranteed by the Government of India (or by the Government of any other colony or dependency of the United Kingdom), which to the directors appear to be safe and advisable, and any part of the moneys of the society so laid out and invested either in Great Britain or Ireland or India may be called in or otherwise converted into money, and may be again laid out and invested as before, provided from time to time as the directors think fit, and the directors may from time to time retain or set apart such sums as they think proper for conducting the current business of the society, and deposit the same in current or deposit account in any banks or with any banking companies.

The CHAIRMAN explained that the words in parentheses constituted the amendments. He was glad to say the directors had exercised the extended powers conferred upon them in such a manner that there had been no losses on the investments they had made, and he thought they might safely be trusted with the additional power sought. (Hear, hear.)

Mr. WILD thought it a pity that there should be any limitation to companies paying dividends on their ordinary stocks or shares. There were many companies not paying dividends on ordinary stock, whose preference stock was a perfectly sound investment. Neither the Great Western nor the Brighton paid dividend on ordinary stock for many years, and yet it could not be said that their preference stock was doubtful security.

Mr. SEAL suggested that the words "public or" should be omitted in the phrase "public or Government securities."

After some discussion the question was put that the words proposed to be left out stand part of the clause. With one dissentient, the meeting voted in favour of the retention of the words "public or." The new clause was then agreed to unanimously.

Mr. SEAL had much pleasure in proposing that the best thanks of the society be given to the Chairman for the very satisfactory and courteous way he had presided over the court to-day, and to the directors for their continued and successful attention to the society's affairs.

Mr. HUMPHRIES seconded the proposition, feeling satisfied that the conduct of their operations could not be left in better hands. (Hear, hear.)

The CHAIRMAN was much obliged for this renewed mark of confidence, as appreciation of duty was gratifying. But they would not be able to discharge their duties so well were were they not supported by their able officers. He proposed a vote of thanks to Mr. Fisher (the actuary), to Mr. Grimes (the secretary), and to the officers of the society.

Mr. J. B. COOPER, as the Liverpool agent of the society for over 40 years, bore testimony to the courtesy of the officers of the society.

The motion was put and carried.

Mr. GRIMES thanked the meeting for passing this vote of thanks to the officers and staff of the society. They were always anxious to do everything they could, and to give every information to those who required it. (Hear, hear.)

The meeting then separated.

SOUTH TOLCARNE TIN MINING COMPANY.

A general meeting of shareholders was held at the offices, Austin-friars, on Monday, Mr. CLARK in the chair.

Mr. HICKEY (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed. The accounts for the four months (charging costs up to Feb. 19) showed a credit balance of 90*l.* 10s. 3d.

The report of the agent was read, as follows:—

We have commenced stamping tinstuff by means of an eight head water stamping-mill near the mine, which we have hired at a rent of 2*l.* per month, and shall sell a parcel of tin on the 29th instant, which will realise about 120*l.* We hope to continue making monthly sales of tin, which will help to meet the cost until we open out the lode at the 50, when we think the chances are that we shall fully meet the cost, and probably make profits.

The CHAIRMAN said he had but little to add to the information contained in the accounts and report. It would be seen that the mine had returned 140*l.* worth of tin, and they hoped it was but the beginning of a regular and steady increase. The prospects of the mine itself were satisfactory, presenting indications that the shareholders were about at last to reap some benefit for their expenditure and patience. The arrears of calls were 472*l.*; a portion of this had been owing a long time. The committee had fully deliberated upon the financial position of the mine, and recommended a call of 3s. per share, which would produce 650*l.*, a sum barely sufficient to pay the merchants' bills. The committee much regretted the necessity of a call, but it was absolutely necessary, as they were indebted to the secretary 300*l.*, cash advanced to meet current expenses.

Mr. F. MACKINTOSH, M.P., said the only object of meeting every four months appeared to be to make a call. Capt. Vivian's reports were always promising with good prospects, but results did not prove their accuracy. He should like to ask Capt. Vivian what were really the present prospects of the mine?

Mr. WATERSTON said that at a previous meeting reference had been made to a copper lode. He should like to know what progress had been made in its development?——Capt. W. C. VIVIAN, referring to the general prospects of the mine, considered them of a most encouraging character, judged by the results obtained in the neighbouring mine, South Condurrow, through which the same lode passed. As the manager for many years of South Condurrow, he knew well its history, and having this knowledge and experience confirmed his opinion of the future of South Tolcarne. In the 40 they had good tin ground for 17 fathoms in length; 150*l.* worth of tin had been taken from it, and in the end east the lode was opening out worth 12*l.* per fathom. In two months he hoped the shaft would be at the 50, at which depth they would have only 8 or 10 fms. to cross-cut to reach the lode. Looking at the favourable nature of the lode at the 40, he had greater confidence in cutting the lode rich at an increased depth than in any mine with which he had ever before been connected.

The CHAIRMAN thought by the next meeting shareholders would be better able to judge of the value of their property.

Capt. VIVIAN said the chances were favourable of seeing the lode at the 50 by that time, and from the ground now being opened out at the 40 he believed they would then be raising tin sufficient to pay the costs, and probably leave a profit. There was not so good a young mine in the whole of the great Camborne district. He firmly believed it would be a better mine than South Condurrow or West Basset. He held one-quarter part of the mine, which was perhaps the best evidence he could give as to the sincerity of his opinion. The copper lode, to which attention had been drawn, had not yet been touched, because the committee had not authorised him to purchase the necessary materials. As yet but little was known of that lode; tributers found the ore near the shaft, and of very good quality. To work it would increase the cost about 50*l.* per month.

Mr. THOMAS said the committee had considered it unadvisable to increase the cost in the present state of depression.

Mr. WATERSTON asked if Capt. Vivian had altered his opinion of the lode?

Capt. VIVIAN said it was a very promising lode for copper, the little bunch found by tributers realised 24*l.* per ton, and they were stopped owing to the water.

Mr. BARTLETT asked if the shares upon which so large an amount of call was in arrear were to be forfeited?——The CHAIRMAN said that was a question for the meeting to decide. The object of the committee was to make the call as light as possible.

Mr. WATERSTON was of opinion the shareholders should adopt the recommendation of the committee, who had no doubt fully considered every point.

The accounts were passed and allowed, and with the report were ordered to be entered on the minutes.

Upon the proposition of Mr. WATERSTON, seconded by Mr. MACKINTOSH, M.P., a call of 3s. per share was made.

After some discussion with reference to the arrears of call, it was decided that the committee should take the necessary legal proceedings to recover them.

Messrs. Clark, Thomas, E. Crawshay, and F. Mackintosh, M.P., were elected the committee of management.

A vote of thanks to the Chairman concluded the proceedings.

GREAT WHEAL VOR UNITED MINING COMPANY.

The quarterly general meeting of shareholders was held at the offices, Gresham House, on Thursday,—Mr. J. O. HANSON in the chair.

Mr. J. J. TRURAN (the secretary) read the notice convening the meeting, and the minutes of the last were confirmed.

The report of the committee was read as follows:—

The committee beg to report that since the last quarterly meeting of the adventurers the development of the mine has proceeded satisfactorily. The engine-shaft has been sunk below the 80, whilst that level has been extended a few fathoms both east and west on a lode which, though not rich, gives every prospect of improvement in depth. Unfortunately, the depressed state of the tin market—the last sale bringing the unprecedented low price of only 39*l.* 2s. 6d. per ton—reduces the net value of the ore so low that explorations which in former times would have been considered productive at the present moment leave little profit, if not an actual loss, thereby preventing the necessary development of the mine being carried on without incurring a monthly loss—in other words, the operations can only be continued by making calls upon the shareholders. The committee have, therefore, resolved to curtail the expenditure for the present as much as possible, and to confine operations to the sinking of the shaft and to working up the refuse about the old dressing-floors, which will keep the stamps fully occupied for some months, and bring the costs very nearly within returns. The pneumatic stamps, which have been mentioned in previous reports, have been completed, and are now at work, giving the greatest satisfaction. A single head, on the same principle, has been added, and it is expected that the returns will now be increased. It will be in the recollection of the shareholders that at the meeting in March, 1874, when the operations now being carried on were contemplated, the price of tin ore was at 55*l.* per ton, the calculations being based upon returns to pay even at 45*l.* per ton. Should, on the one hand, tin rise, or the mine improve, to give results equivalent to this, there are large quantities of stuff in sight that would pay for taking away. The shareholders must thus clearly see that it is the extremely low price of tin which causes the present depressed condition of the company. Although power has been vested in the committee, by a special resolution of the shareholders passed at their meeting in December last, to dispose of all or any of the relinquished shares, the committee have thought it best for the interest of the company not to dispose of any, hoping that they may be able in the future, if necessary, to sell them to greater advantage. These would then prove a valuable asset. No further sales have been made of the plant in use on the old mine, an engine being still on hand, which is valued at 200*l.*

On the publication of the audited accounts to Jan. 31 last there was a balance in hand of					£	112 6 3
Since which date there has been received—						
Tin sold Feb. 24						80 2 2
,, March 23						121 14 6
Loan from Messrs. Harvey and Co.						265 14 3
On account of call made Sept. 30 last						30 1 11
Tribute and royalty on tin sold from leavings						17 19 3
Half-year's rent of Trelissick						7 10 0
Total					£	634 18 4
And paid—						
Labour pay due Feb. 25			£	265 14 3		
,, March 24				272 8 7		
,, April 23 (on account)				20 0 0		
Travelling expenses to the mines				7 10 0		
Sundries, postage, discount, &c.				4 2 0=		569 14 10
Balance					£	65 3 6

The actual accounts stands this day as follows:—

LIABILITIES—Merchants' bills		£1098	11	5	
Lords' dues		5	3	6	
On relinquished shares		688	12	1	
Loan from Messrs. Harvey and Co.		265	14	3	
Harvey and Co., for engine, say		265	0	0	
,, for stamps, say		195	0	0	
,, ,,		139	0	0	
Salaries, three months		61	0	0=	2709 1 3
ASSETS—Arrears of call made, September, 1875		20	14	5	
Old materials unpaid		20	10	0	
Cash balance, as above		65	3	6=	106 7 11
Leaving balance against the mine					£2602 13 4

To enable the committee to pay off a portion of the present liabilities, and to carry on the operations for the next three months, the committee recommend a call of 5s. per share, and a resolution to that effect will be submitted for your consideration. In conclusion, the committee can only hope that the measures they have taken for the future working of the mine may enable them to present a more favourable report at the next quarterly meeting.

The report of the manager was read as follows:—

March 29.—The engine-shaft is sunk 2 fms, 2 ft. below the 80 fm. level. The lode in the bottom of the shaft is producing a little more tin, now worth 15*l.* per fathom, with a very kindly appearance. We are sinking the shaft, by nine men, at 20*l.* per fathom. We have suspended all other points of operation for the present, so as to bring the cost as near as possible to the returns. The pneumatic stamps are working most satisfactorily, and we have to day set the single head to work, and will report on this in a day or two; I have no doubt it will give entire satisfaction.—S. HARRIS.

Extract from Capt. Harris's letter, dated March 29:—"The lode in the shaft appears to be improving, and I have no doubt by the time we get down another level we shall have a more productive lode. I hope the company will not get out of heart until we sink the 30 fms. on which we started, and during that time I will do my best to keep the cost as nearly as possible to the returns. A little improvement in the shaft or in the price of tin would put us right. I hope the meeting will pass off well."

The CHAIRMAN said the committee extremely regretted it was not in their power upon the present occasion to submit a more satisfactory report; two causes mainly had operated against them. One was that they had not received the pneumatic stamps to enable them to make greater returns of tin so early as expected; the engineers had promised to deliver them on Dec. 6, but the advantage of them had been realised for only about three weeks of the past quarter. The other reason was the unprecedentedly low price of tin; the last sale realised only 39*l.* 2s. 6d. per ton. He believed such a price had not been known since 1850; shareholders might naturally ask what were the prospects that tin would be higher in price in the future. From the best information that could be gathered at the present moment it was more a question of hope than of certainty. Ever since tin was at about 50*l.*, or perhaps 45*l.*, it had been thought the price could not further decline, but still it had done so. Large quantities had come from Australia at almost a nominal rate of freightage; although consumption increased it had not been sufficient to overtake the supply. Should, however, the price improve to the extent of only 6*l.* or 7*l.* per ton, or should the mine improve, of which there was every reasonable expectation, the company would soon recover its position. In anticipation of this meeting the committee had had very careful estimates prepared by the manager for the future working of the mine, but, thinking those estimates, moderate as they were, yet still too high, the secretary was instructed to proceed to Cornwall to meet a member of the committee on the mines, to carefully analyse every detail; each man's duties were distinctly defined, so as there should not be one single hand employed that was not absolutely necessary. In addition to this, arrangements had been made with two other companies to share the expense of the London office, although during the last quarter it had been done up without any expense to the company. Unfortunately, they could not get on without money; it would be necessary to-day to make a call for the purpose of providing funds to carry on the mine, and a resolution would be proposed presently that a call be made of 5s. per share. Any further information in his power he would gladly afford, or to any enquiry he would be happy to reply. He might mention it had always been expected that upon reaching the 100 the mine would become very productive; and certainly, as far as they had gone, the anticipations of the manager had

been fully borne out, inasmuch as in depth the lode enlarged and became more valuable; a depth of 82 fms. had been reached, leaving only 18 fms. more to sink to obtain the necessary depth.

A SHAREHOLDER enquired to what purpose would be applied the proceeds of the proposed call.—The CHAIRMAN said partly in paying off the liability, and partly to meet the current expenses of the mine during the next three months.

A SHAREHOLDER drew attention to the item of 966*l.* for labour.—Mr. MARSDEN (a member of the committee) replied that the item for labour would be considerably reduced.

The CHAIRMAN said the estimates were that if the returns were only 4 tons of tin per month—and the hope was 5 or 6 tons would be returned—the monthly loss would not exceed 62*l.*, that is, supposing no rise took place in the price of tin, and the mine did not improve.

Mr. TRURAN mentioned that the driving of the two levels had been suspended, and that it was not proposed to resume them until tin improved in price.

The CHAIRMAN proposed that the accounts be passed and allowed.

Mr. WALKER seconded the proposition, which was put and carried unanimously.

The CHAIRMAN reminded the meeting that the call the shareholders had authorised the committee to make to meet the claims due upon the relinquished shares had not yet been made—that would amount to about 2s. 6d. per share.

Mr. MARSDEN said that the relinquished shares were of much greater value than the claims due upon them.

A SHAREHOLDER asked whether it would not be better to offer the relinquished shares *pro rata* to the existing shareholders?—The CHAIRMAN said that was a question which the committee would take into consideration.

A call of 5s. per share was then made. The committee of management were then re-elected, with the usual remuneration. Mr. William Moates was re-appointed auditor.—Mr. BAKER said the meeting could not separate without passing the committee a sincere vote of thanks for their continued attention to the company's interest. The resolution was put and carried unanimously.

The CHAIRMAN, on behalf of his colleagues and himself, thanked the shareholders for this renewed mark of confidence. It was only by such confidence and co-operation that they could hope to again bring the mine into a condition of prosperity.—The meeting then separated.

MEDLYN MOOR MINING COMPANY.

The general meeting of shareholders was held at the company's offices, Gresham Buildings, Basinghall-street, on March 24,

Mr. E. HILTON in the chair.

Mr. GRANVILLE SHARP (the secretary) read the notice convening the meeting, the minutes of the preceding one were confirmed, and the statement of accounts for the 24 weeks ending Jan. 22, showing a debit balance of 332*l.* 2s., was passed.

The report of Capts. Joseph Prisk and Charles Rowe was submitted and approved; it stated that the tin sold has been principally got from driving the levels, as little or no stoping has yet been done, and none from the slimes (which is about one-third) is yet sold, the machinery for dressing it not being quite in working order. The mine generally is opening out very satisfactorily, and as there are four well-defined lodes within a very short distance from the main shaft, and the ground exceedingly easy for exploring, and requiring no timber, which is a special advantage; and so soon as the next level is reached, and the several lodes are a little explored, we have every reason to expect a paying mine, and that, too, even with the present low price of tin.

The SECRETARY reminded the shareholders that until May the engine would not have been working twelve months. Since that was put to work the shaft had been sunk to the 17, and was being sunk below that. At the 17 cross cuts had been put out north and south. By the former two lodes had been intersected, and by the south one one lode had been discovered, while a second was daily expected, so that within a few days four lodes will have been intersected from this level alone, which is a very important feature for tin mining at the present time. The shaft also has been sunk below the 17, and will be continued to a 27 fm. level, in order to cut the same lodes at a further depth of 10 fms., thereby giving a further 10 fms. of backs on each of the four lodes. There are other two shafts, each sunk on a lode, which can be worked by the engine by means of flat rods whenever it is considered advisable. He did not know another tin mine in Cornwall offering such inducements for spirited operations as did Medlyn Moor.

A call of 2s. 6d. per share was made, payable on April 24, subject to a discount of 5 per cent.

The appointment of Capt. Prisk by the committee manager of the mine, in the place of Capt. James Rowe, deceased, was confirmed.

A vote of thanks to the Chairman concluded the business of the meeting.

LOVELL MINING COMPANY.

A meeting of shareholders was held at the company's offices, Gresham Buildings, Basinghall-street, on March 25,

Mr. BIDDER, jun., in the chair.

Mr. GRANVILLE SHARP (the secretary) read the notice convening the meeting, the minutes of the preceding one were read and confirmed, and the accounts for the 24 weeks, showing a debit balance of 349*l.* 13s. 11d., were submitted and passed.

The CHAIRMAN congratulated the shareholders upon the satisfactory position of the accounts, remarking that they would see that everything was charged up to the latest possible date. Shareholders would see that they included the month ending March 4, which was not payable until April 1. The committee had availed themselves of a favourable opportunity for the purchase of an engine to work the stamps in the dry season. When they considered the assets in the statement of accounts, there was one that the shareholders must really regard as of no value, and that was a debt of 889*l.* 11s 7d. and the calls upon it. He, however, thought it desirable that they should make a moderate call upon the present occasion. It is proposed to hold a special meeting to forfeit all shares in arrear of call, and the shares so forfeited would include the whole of the shares belonging to the shareholders mentioned. He concluded by moving the adoption of the accounts.

Mr. GODDARD seconded the motion, which was carried unanimously.

The agent's report was read and explained to the shareholders by the assistance of the plan of the mine, and subsequently adopted.

The CHAIRMAN said there were 5120 shares in the mine, of which 960 were had, and some others would have to be forfeited. Practically, therefore, they were making a call on 4000 shares, and a 2s. call would bring in about 380*l.*

After some little discussion it was resolved—"That a call of 2s be made, payable on April 15, subject to 5 per cent. discount." A resolution authorising the committee to overdraw the banking account from time to time for the requirements of the mine to the extent of 500*l.*

The meeting was then made special for the purpose of forfeiting shares in arrears of call.

The calls in arrears, as explained by the Chairman, were 190*l.* 2s. 6d., out of which amount 112*l.* was due to the 900 shares held by the secretary in trust for the company for the debt already referred to.

The CHAIRMAN moved "That all shares in arrear of call be, and are hereby, forfeited, but subject to restraint if the amount due on them be paid on or before April 15."

Mr. PARKER seconded the motion, which was put and carried unanimously.

A vote of thanks to the Chairman terminated the meeting.

BROOKWOOD MINING COMPANY.

At a general meeting of adventurers, held at the purser's office, Liskeard, on Monday (Mr. JOHN C. ISAAC in the chair), the accounts presented for twenty weeks, to Dec. 31, showed a credit balance of 15*l.* 11s. 4d. The following report was read to the meeting:—

March 27.—We have done but very little at the 120 fm. level since the last meeting, hence no change has taken place. The lode in the 110 fm. level east is 4 ft. wide, principally composed of capel, poor for ores and spare for driving. We have about 10 fms. more to drive before we reach the ore gone down in the bottom of the 100, and about 20 fms. will reach the winze referred to in my last report—now down between 7 and 8 fms., and is suspended. We had hoped to have made better progress in driving this level. The ground here has been hard. We anticipate a change, judging from a favourable one that took place at the 100 over this point. The lode in the 110 west is large, but poor for ore. There are three stopes working in the back of the 110 west, yielding on the average from 4 to 5 tons per fathom. The lode in the 100 fm. level east is 5 ft. wide, and is worth 2 tons of copper ore per fathom. There is one stope working in the back of this level, yielding 3 tons of copper ores per fathom. The lode in the 90 end east is 1 ft. wide, worth 1 ton of copper ore per fathom. Ground hard. There are two stopes in the back of this level, worth from 3 to 4 tons of ore per fathom. The lode in the 80 fm. level east is now small, and yielding only stones of ore. There is one stope working in the back of this level, worth 3 tons of ore per fathom. There are two or three stopes working in the bottom and back of the 100 west, yielding about 2 to 3 tons per fathom. The foregoing are the principal operations, and it may not be amiss in my remarking that these four levels referred to driving east, going into new and unexplored ground, have not yielded equal to our expectations; we had at times in these ends very flattering indications and ores of rich quality. And seeing every level was looking favourable in the same run of ground, we were somewhat sanguine of better results than we have realised. Such drawbacks, with poor prices for ore, and the thirteenth month in the accounts, leave us this day minus of any dividend. For the future we shall push on the eastern levels reported on, and still hope to open up a mine which will again give us profits, even if we should not regain our former prosperity.—THOMAS TREVILLION.

ST. AUBYN UNITED MINES.

At a meeting of shareholders, held at the mine on March 23, the accounts for the four months ending January showed a debit balance of 902*l.* 4s. 2d.; a call of 1*l.* 15s. per share was made. The following report was read to the meeting:—

March 23.—In the 35, driving east of shaft, on the north lode, the lode is 1½ ft. wide, producing good stones of yellow copper ore. The 25 east, on north lode, is 15 in. wide, composed of gossan and flour spar, with rich stones of grey copper ore, but not enough to value; I think the lode in this end will improve again in a few fathoms driving; about 10 fathoms behind this end we have commenced to sink a winze where the lode will produce 1½ ton of copper ore per fathom. The 12 is extended 20 fms east of the engine shaft cross course, on the No. 1 lode, which is composed of gossan, pryan, and spar, with rich bunches of grey copper ore, a good-looking lode; there is no doubt but that it will prove productive in depth. Finding the water in the south or old part of the mine going down, I have taken out the dam in the 25, and commenced to clear out same towards this lode, and as soon as we get sufficiently near to where the water broke away in August last we shall drive a side level to intersect No. 1 lode a few fathoms east of the cross course, where we expect it productive. In the 12, south of middle lode, we have 16 fms. more to drive to cut Williams's lode, and looking at its productiveness in the adit, which is extended 25 fms. east of cross-courses, where the lode in the present end is worth 8*l.* per fathom for copper and tin, we can but expect good results. Perkin's shaft is sunk 31 fms. from surface; the last 3 or 4 fms. sinking the lode has greatly increased in size, being now 5 ft. wide, producing rich stones of grey and yellow copper ore; there is no doubt in depth this lode will be found remunerative. The men are now driving east and west from this, where the lode is just of the same character. We intend to resume sinking this shaft in the course of a month. We have also commenced to drive south from shaft towards the south lodes, where we expect in the next 25 fms. drivage to intersect four lodes. From the foregoing you will observe we have three or four important points which we hope to reach during this summer, and from the indications these lodes possess in the shallow level at various points where they have been seen, I consider either one of itself a sufficient recommendation as more than an ordinary speculation.—JOHN MICHELL.

WEST GODOLPHIN MINING COMPANY.

The general meeting of the shareholders was held at the offices of the company, Great St. Helen's, on Tuesday,

Capt. GLADSTONE in the chair.

Mr. CHARLES THOMAS having read the notice convening the meeting, the minutes of the last were read and confirmed. The statement of accounts, showing a credit balance at the bankers of 569*l.* 14s. 7d., was read and passed.

Capt John Pope said:—We have employed on the mine 113 men, 15 boys, and 19 girls. Our machinery is all in good working order. I calculate on getting our stamping engine and stamps all brought home on Monday next, when we shall erect it as fast as possible. We have sold to day 13 tons 12 cwts. 1 qr. 2 lbs. of tin at 42*l.* 5s. per ton = 575*l.* 3s., and we have about 5*l.* worth of copper dressed ready for sale.

The CHAIRMAN stated that he was pleased to announce that the financial position of the mine was so far satisfactory that the whole of the costs, including merchants' bills, were charged up to the latest moment practicable, and that the whole of the liabilities were paid off to that date, and notwithstanding the great disadvantage the mine was under in respect to the low price of its principal produce, tin, the accounts showed a balance on the right side. He was inclined to think that this was a subject upon which he was justified in congratulating the shareholders.

Mr. CHARLES THOMAS explained that in order to meet the difficulty under which the mine was now working on account of the reduced price of tin, it was found necessary to continue, if not to increase, the present output; and in order to dress and make marketable an increased quantity of tin, it would be necessary to add to the present stamping power. Hitherto all the stamping and dressing machinery had been worked by water power, which in the winter months was ample for the requirements of the mine, but in the summer months and during the dry season was insufficient to return the 13 or 14 tons which were now being raised every four weeks, and which were necessary to enable the mine being worked without loss. The improved state of the mine, and more particularly the rich deposit of tin now being developed in Wilson's lode would, with an increased dressing plant, place the mine in a position to keep up or increase its present monthly produce; a steam-engine and an additional 16 heads of stamps had, therefore, been purchased, and would in a short time be at work.

The committee of management was re-elected, and a vote of thanks to the Chairman concluded the meeting.

CANADIAN COPPER AND SULPHUR COMPANY.

The first ordinary general meeting of shareholders was held at Glasgow, last week, Mr. GEORGE WILSON, of Dalmarnock, Chairman, presiding.—The CHAIRMAN stated that the first thing he had to do was to give a short statement in reference to the reconstruction of the company and as to its present position. The object of re-construction, as they were aware, was principally to reduce the amount of liability upon the shares. That had been done by converting the 7*l.* shares, on which there was a liability of other 3*l.*, into shares of 4*l.* fully paid and 3*l.* bearing a call of 1*l.* The new company was incorporated on Jan. 4 last, and what was before the Canadian Copper Pyrites Company was now the Canadian Copper and Sulphur Company (Limited). As to the present position of the company, he could not say that they were making, so far as he could see, any profits as yet, and he thought they must make up their mind, at the next balance, to a further loss, although he hoped it would not be at all at the same rate as in previous years. When he accepted the position of a member of that board he stated pretty distinctly that he was not at all sanguine of the prospects of the company. He had very great doubts about the existence of copper-bearing ore in their mines, and very great doubts, even if it existed, of its being turned to profitable account. He did not generally take a very hopeful view of speculative concerns of that sort, but he had great satisfaction in now looking upon the prospects of the company with a great deal more hope than he did when they last met. They had gone to considerable expense in sending out to Canada Mr. Cobley, who was an expert in mineralogy and in the treatment of copper bearing pyrites chemically. Mr. Cobley had furnished them with a draft report, which they did not deem it expedient at present to complete, but the effect of the report upon the minds of the directors was that they believed there was a large quantity of copper-bearing ore in their mines, much of which could be mined and brought to the surface at a greatly reduced cost as compared with that at present necessary to obtain their pyrites at Capelton. They believed also, that although the present process of treating the Capelton ore was one, which could not in the nature of the case, yield a satisfactory result, that these ores might yet be treated in a way that would yield profits results. In reference to the compromise which had been effected by the directors in certain lawsuits in which the company was interested, under these compromises they had accepted shares, believing them to be worth considerably more than the present market price.

The CHAIRMAN said there still remained what to him was an exceedingly unpleasant duty, that was to talk about the remuneration for his own and his colleagues' services. He did not happen to be a rich enough man to give his services for nothing, or on liberal terms, to that company, and he gave the shareholders very full warning in June last that he had not the slightest intention of doing so. The terms he originally named to the friends who asked him to consent to take upon himself the burden of chairman of the company were these—a bonus of 5000*l.*, an interest of one tenth in the surplus profits above 10 per cent, and, if he was obliged to go to Canada, the usual terms given to a professional man—seven guineas a day, and his expenses. He had thought it right to modify these terms to this extent, that he did not ask the 5000*l.* bonus; the only bonus he asked was the tenth of the surplus profits during five years. That, of course, was conditional upon the success of the company; failing that success he got nothing. And 1000*l.* was payable on Jan. 1 of each year so long as the shareholders chose to have him for their chairman. He was quite aware that these terms were tolerably stiff, but he had not the slightest intention of forcing them on himself upon the shareholders; if they thought they could do better they were entirely at liberty, because he could see that whoever occupied the position of chairman would have to give a great deal of time and anxious care and thought to the work. He hoped there would be no haggling about the matter—no demand to break down the bargain, but a polite Yes, or a polite No. As to his colleagues, it was proposed that they should have among them another thousand a-year, and another tenth of the surplus profits.

In reply to a SHAREHOLDER, who asked whether the directors had any reasonable hope that during the present, and probably the next, year the 6000*l.* of salaries to the directors would be realised out of the profits of the concern, or were likely to be taken out of the capital?

The CHAIRMAN said that he was more than usually hopeful of the prospects of the concern, but he would not like the directors to assume that there was a certainty of a highly profitable result within a year or two. His bargain would not be conditional upon results; if he gave his time and his strength to the concern he would be paid for them, whatever the result may be. Otherwise, he thought he could devote his time to as great advantage.

After some conversation it was agreed, in order to give the shareholders time to consider the chairman's proposals, to hold another meeting to decide upon them on 10th prox.

Replying to other shareholders, the CHAIRMAN said it was difficult to give an idea of what the company was at present losing, but the directors thought—they might be wrong, however—the loss was something like 3000*l.* or 4000*l.* a-year. The loss had been greatly reduced within the last six months.

After a short statement by the chairman as to the sale of the sulphur, the proceedings were brought to a close.

CATHEDRAL TIN AND COPPER MINING COMPANY.—The ordinary general meeting of shareholders was held on Friday, at the London Tavern. Mr. Matthew Greene (the Chairman) said the present were rather depressed times for the mining interest, and the year which had just been passed through had been an unsuccessful one for most joint stock enterprises. However, a fortunate moment had been selected for discussing the affairs of the Cathedral Mine, as that point in its development had just been reached which it was contemplated at the formation of the company would have been reached some time ago. But this was from no fault of the management, but simply from the fact that Nature will work her own course, whatever may have been anticipated by those who develope her treasures. It had been necessary to go deeper than had been expected, but from the changes which had recently been met with in the workings they were justified in believing that in Cathedral Mine they had what promised to be a most successful property, and there were many shareholders in the room who had taken the opportunity of inspecting the mine who would confirm his remarks. Probably no district in the world, not excepting South America, had proved so remunerative to miners as the Gwennap parish, in which district the Cathedral Mine is situated. On all sides of it, although many mines are now dormant, having been developed to a great depth—most successful workings have been carried on, resulting in large fortunes to those engaged in their development; for instance, many of the influential county families were indebted to the copper mines of Gwennap for their large fortunes. They were working on ground little to unwrought, although to the east and west, and particularly to the south, very successful enterprises had been carried on. It was not only expected that before this time profitable returns would have been made, although for the depth which had been attained the actual returns were looked upon as very remarkable by old-fashioned miners. He (the Chairman) had, during the past twelve months, consulted on his own behalf as a large shareholder, and on behalf of the rest of the shareholders, many very competent mining authorities, who had one and all urged him to prosecute the mine with vigour, as the prospects of great and early success were very decided. He had obtained the opinions of no less authorities than Capt. Teague, Capt. Southey (who has been so successful at West Chiverton), besides other opinions of almost equal value, all of which were most encouraging. The plans of the mine were on the table for the inspection of the shareholders, and Capt. Michell, who was present, would be very happy to give every information upon any point.—The accounts from December 1, 1874, to December 31, 1875 (a period of thirteen months), showed a balance of liabilities over assets of 400*l.* 8s. 4d.—Mr. Crockett: The manager says that in a short time we shall be paying handsome dividends. How long do you think?—Captain Michell: Within a year, I believe.—Mr. Crockett: What amount of ore would it be necessary to raise to pay a 10 per cent. dividend?—The Chairman: If we sold 200 tons a month we should pay 20 per cent.—Mr. Crockett: When is it likely that we shall return that quantity?—Capt. Michell: I should say within six months from the present time.—The Chairman: With the present indications I shall be very much disappointed if, within a year, we do not return 5000*l.*—Mr. Crockett: I understand the mine is productive now, and that it is paying its way.—The Chairman: Capt. Michell has told me that the mine will be paying 500*l.* a month profit within twelve months, which, on our small capital, would be a very handsome return.—Messrs. Greene, Adam Murray, and Laby were elected directors for the ensuing year.—The Chairman said it would now be advisable to discuss the most prudent way of getting more capital.—It was resolved that a meeting should be called forthwith to increase the capital of the company by 5000 shares of 30s. each, of which it is not anticipated that more than 15s. per share will be called.—The Chairman said the mine was looked upon as a most promising affair by miners who know the neighbourhood, and great things are expected of it.—Mr. Laby remarked that he had been over it several times, and he was very much pleased with its appearance.—Mr. T. Gundry said the mine was thought very highly of in the neighbourhood, and the expenses of returning copper were very small in comparison with those incurred in tin mining. He (Mr. Gundry) mentioned as an instance of the richness of the locality in which the Cathedral Mine is situated that his uncle when working the Wheal Neptune (of which his uncle and father were the discoverers), when the number of men employed was reduced to two working in the adit, one of the men in driving on the lode came upon ore, which before the end of 12 months enabled the owners of the mine to divide 4000*l.* in clear profits.

BANTRY BAY BARYTES COMPANY.—At the meeting held on Thursday the accounts and directors' report were unanimously adopted, and the rest of the business adjourned to April 20, when directors will be proposed and elected, and a plan also submitted for placing the future management of the property in a more effective state.

ROSEWALL HILL AND RANSOM UNITED.—At a special meeting of the adventurers it was resolved, on the proposition of Mr. Bamfield, and seconded by Mr. S. Hosken, that, in consequence of the very large number of shares relinquished since the last setting day, the mine be offered as a going concern, by Mr. Thomas, of Redruth, at the account-house, on April 5; and that the affairs of the present company be wound-up as speedily as possible. The accounts at the meeting were also audited and passed, which showed a balance against the adventurers of 2535*l.* 16s. 1d. There is included in the above account wages paid from Oct. 8 to Feb. 26, 2225*l.* 12s. 3d.; merchants' bills and coals, 954*l.* 5s. 3d.; and bank charges, &c., amounting to 61*l.* 15s. 11d.; making the total costs 3240*l.* 12s. 10d. There were credited tin ores 17 tons (the highest price was realised on December 11, at 45*l.* 2s. 6d.), 785*l.* 0s. 7d. The last lot of tin sold was Feb. 25, 5¼ tons sold for 42*l.* 15s. The purser in his circular of March 24 gives the adventurers notice of the special meeting to be held on the 4th, to confirm the assent of the shareholders to the proposition to sell the mine.

JAVALI COMPANY.—At the meeting of the shareholders of the above company, yesterday, the directors' report was adopted. A full report will appear in next week's Journal.

LUSITANIAN.—The general meeting, convened for Thursday (Mr. H. Reeves the chair), was adjourned to April 27, an insufficient number of shareholders having been present to form a quorum. Notice had already been given that the meeting was to be held *pro formâ* and adjourned, as Mr. Richard Taylor is about to proceed to Portugal to inspect the mine. Upon Mr. Taylor's return the accounts and the latest information will be circulated among the shareholders.

[For remainder of Meetings see to-day's Journal.]

IN *RE* THE NATIVE IRON ORE COMPANY (LIMITED).

COURT OF APPEAL, LINCOLN'S INN, MARCH 28.

(*Before Lords Justices* JAMES, MELLISH, *and* BAGGALLAY.)

This was an appeal from a decision of the Vice-Warden of the Stannaries. The question in dispute arose upon the construction of sec. 43 of the Companies Act, 1862, which provides that "every limited company under this Act shall keep a register of all mortgages and charges specifically affecting the property of the company, and shall enter in such register in respect of each mortgage or charge a short description of the property charged or mortgaged, the amount of charge created, and the names of the mortgagees or persons entitled to such charge. If any property of the company is mortgaged or charged without such entry as aforesaid being made, every director, manager, or other officer of the company who knowingly and wilfully authorises or permits the omission of such entry shall incur a penalty not exceeding 5*l.*" It is also provided that the register of mortgages is to be open to inspection by any creditor or member of the company at all reasonable times, and a penalty is imposed for refusing inspection. The above company was formed in January, 1873, to work some iron mines in Devon and Cornwall. The Articles of Association empowered the directors to borrow money on behalf of the company, and to issue bonds, obligations, or mortgage debentures, and execute mortgages of the company's property, or any part thereof, for securing the repayment of any money borrowed with interest. On Jan. 16, 1875, the company was ordered to be wound up. On Aug 7, 1874, Sir Howard Elphinstone, Mr. George Rosser, and Mr. Henry Lyle Marsh, three of the directors, advanced a sum of 800*l.* to meet the pressing necessities of the company, on the security of a debenture of the company of that date, by which the company purported to charge "their undertaking, and all sums of money arising therefrom, and all the estate, right, and title of the company thereto," with the payment of 800*l.*, and interest at the rate of 10 per cent., the principal to be paid on Oct. 8, 1874. This debenture was entered in a register kept by the company, called the "Debenture Register," in which were stated the date of issue of the debenture, the names of the holders, the amount secured, and the term for which it was issued; but there was no description of the property mortgaged or charged. The amount of the debenture not having been paid, the three directors claimed to prove in the winding up, in priority to the general creditors, for the sum of 856*l.* 7s. 4d.—the amount of principal and interest due on the debenture. The Vice-Warden held that, by reason of the defect in the registration, the claimants were not entitled to priority over the general creditors, but must rank with them. The claimants appealed.

Mr. EDDIS, Q.C., and Mr. HORNELL, for the appellants, argued that as the Act did not say that the omission to keep a register should make the security void, and as the register which had been actually kept, though imperfect, was enough to give notice to the creditors generally that the company had charged their property, there was no sufficient equitable ground for depriving the appellants of their priority.

Mr. Northmore Lawrence, for the official liquidator, was not called upon.

Lord Justice MELLISH was of opinion that the decision of the Vice-Warden was perfectly right. It was an established rule that when a director or officer of a limited company advanced money on the security of a debenture or mortgage of the company, and omitted to register it in compliance with sec. 43 of the Act, the consequence was that he could not rely upon the charge so created. It was so decided by Vice-Chancellor Malins in the case of "The Wynn Hall Coal Company" ("L. R.," 10 Eq., 515), and by the late Master of the Rolls in "*Re* the Patent Bread Machinery Company," and his decision was afterwards affirmed on appeal by Lord Justice James ("L. R.," 7 Ch., 289). The rule so established was founded on a perfectly good, equitable principle. The question raised now was whether there was any distinction in principle between not registering the mortgage at all and registering it without the essence of that which the Act intended to be stated on the register—a description of the property charged. It would be absurd to make such a distinction. Indeed, the omission of a statement of the property charged would have been more calculated to deceive than an omission to register at all, as it would naturally lead to the inference that no property was charged. The appeal must be dismissed.

Lord Justice BAGGALLAY was of the same opinion. He entirely assented to what was said by Lord Justice James in the case of "Patent Bread Company," that "every one standing in a fiduciary position towards the company is bound to see that the company obeys the directions of the Legislature; and I am of opinion that the failure of the appellant to do so is fatal to his case." So in the present case; the duty of these directors was to see that their debenture was registered according to the provisions of the Act, which were distinct and precise. They have failed to do this, add could not, therefore, be allowed to have priority over the other creditors of the company.

Lord Justice JAMES.—This appeal will be dismissed, with costs.

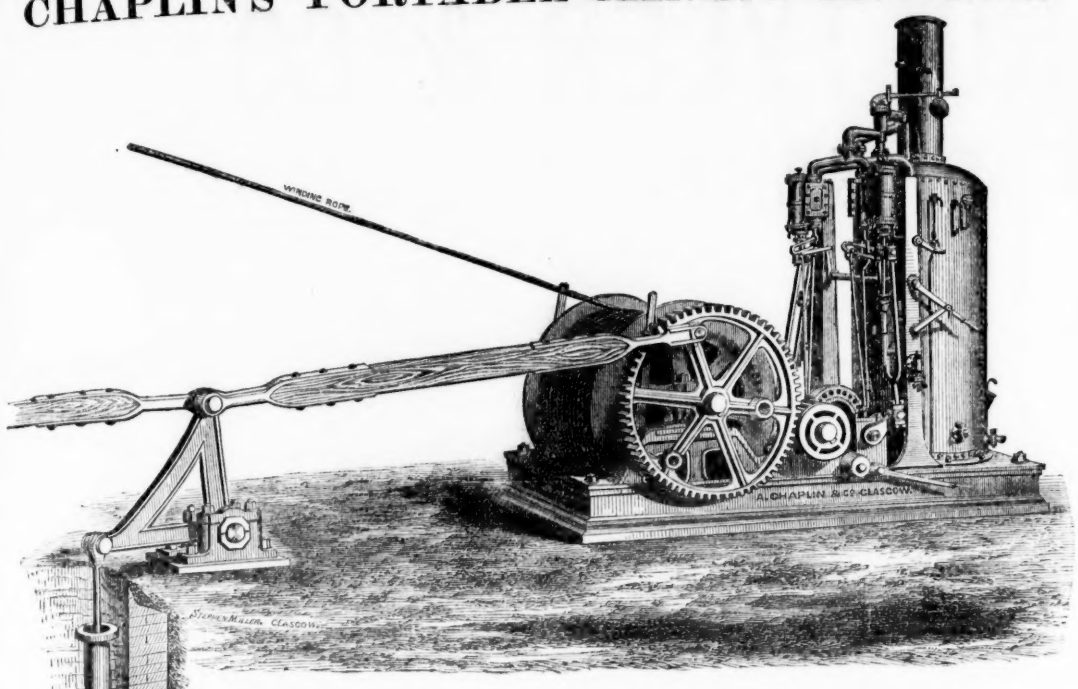
Mr NORTHMORE LAWRENCE.—This will include the costs of attendance of the official liquidator with the books of the company.—Their LORDSHIPS assented.

GALVANISING IRON.—From the skimmings of the zinc pots which are used in galvanising iron Mr. E. W. JONES, of Wolverhampton, prepares an oxide of zinc containing a large percentage of pure zinc oxide, by mixing the said skimmings with carbonate, oxide, or hydrate of calcium, or of the other alkaline earths, or of the fixed alkalies, and heating the mixture in a retort or other suitable vessel sufficiently to cause a decomposition resulting in the production of zinc oxide and a chloride of the alkaline earth or alkali soluble in water. He then separates the soluble substances from the insoluble zinc oxide by treatment with water; otherwise, instead of heating the mixture as described, he boils it in water and obtains a similar result, when after allowing the zinc oxide to subside he draws off the water containing the soluble substances, and washes the zinc oxide with water to separate more thoroughly the soluble impurities therefrom. After the production and purification of the zinc oxide by either method, it is dried for smelting or other purposes. The compounds of ammonia given off during either process may be utilised. Those of the carbonates which are insoluble in water are not so effectual or convenient in the boiling process as in the heating process.

CHARGING GAS RETORTS.—The invention of Mr. J. W. WHITAKER, of Wakefield, consists of a cradle or movable stand whereon the scoop is placed before filling. The scoop itself is very similar to that now ordinarily employed, but is provided, if thought desirable, with rollers at the bottom to assist in introducing it into the retort with greater ease. In front of the retort benches, and either depending from the roof or supported by the retort-house walls, or other suitable manner, is constructed a light railway upon which a traveller is free to run from end to end of the retort-house. This traveller has fixed to it a bar parallel to the same, on which runs a grooved wheel or pulley, from which hangs a rope or chain forked also at its lower extremity so as to receive and form a fulcrum for a lever pivotted thereto. To the short end of the lever is jointed a rod which is connected by means of a swivel to a hoop made to embrace the scoop, the other or long end of the lever being furnished with a rope or chain. When the scoop is filled, and the leveller is adjusted, and the rod depending from the short end of the lever made to engage in the hoop, and while one man takes hold of the cross handle of the scoop another pulls upon the long end of the lever, thus raising the scoop to the desired level. The man at the handle then thrusts the scoop so hung into the retort, turns and withdraws it with the greatest ease, the man at the lever lowering it into the cradle ready for the repetition of the operation.

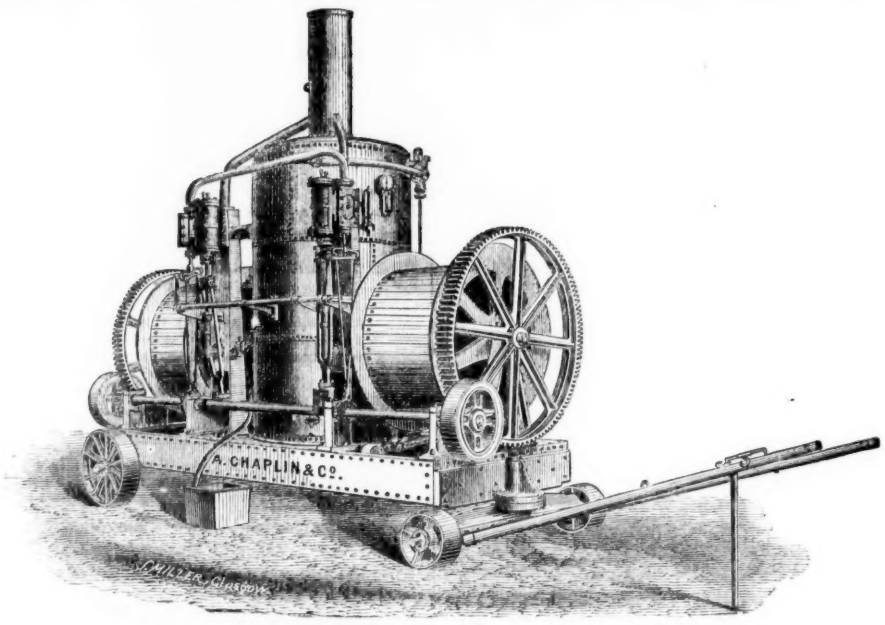
STEAM-BOILER FURNACES.—The improvements invented by Mr. J. SAWYER, of Alma-street, New North road, consist in the application and employment of longitudinally sliding furnace bars, and of an air conducting box or chamber, whereby more perfect combustion of fuel is effected, and less smoke is produced than hitherto, thus effecting an economy in the quantity of fuel consumed.

CHAPLIN'S PORTABLE MINING ENGINES.



We illustrate herewith two types of Portable Mining Engines, as constructed by Messrs. ALEXANDER CHAPLIN and Co., of the Cranston Hill Engine Works, Glasgow.

The first of these, represented in Fig. 1, is, strictly speaking, semi-portable, and shows a combined arrangement for winding and pumping. In the smaller sizes of this engine class, as shown in our woodcut, the boiler, engine, and gearing apparatus are all usually fixed on one frame or sole-plate, thus dispensing with any costly foundation. Beginning with the boiler, which is of the vertical type, it is constructed in the same style as what the fore-mentioned firm call their "Patent Dome Boiler," designed with a large area of fire-grate and high internal fire-box. These boilers, we are informed, are specially suited for forcing the combustion of the cheaper kinds of fuel, such as coal dross, woods, peats, refuse from sugar canes, and other cheap and not easily consumed fuels. The fire-box is completely surrounded by a water shell, and as the top of the former is so far removed from the grate, it is not liable to be acted upon injuriously by the heat of the fire. The sediment that falls into the water space below the fire-grate may be removed by using the blow-off cock, and by taking off the mud hole doors at regular intervals of from one to three months, according to the quality of water used. Cross tubes, increasing the heating surface and assisting to stay it against any tendency to collapse, are also introduced, and these, no doubt, also tend



to improve the circulation of the water in the boiler. By the application of the forced combustion and smoke burning apparatus, these dome boilers, we are informed, have been found to steam equally well with any of the fore-mentioned inferior fuels, and may thus be worked at a very small cost for fuel in situations where an ordinary boiler could not be so satisfactorily worked. These boilers are tested to at least twice their working pressure before leaving the works.

The engines are made either with single or double cylinders, the latter being shown in our engraving as being preferable, especially when rapid action is required. Each cylinder is attached to an upright standard resting on the sole-plate, and away from the boiler. The crank-shaft, which is worked by means of the ordinary connecting-rods from the cylinders, is kept steady by pedestals on the sole-plate. The winding-drum shaft, which is also supported on the sole-plate by pedestals, has a large toothed wheel fitted up on one of its extremities, which is driven by pinions from the crank-shaft. The drum is mounted on its shaft within the sole-plate, and these engines can also be fitted with two winding-barrels or with pirns for flat rope when required. The pumping gearing as shown in our illustration was formerly accomplished by the pump connecting rod being also attached to the forementioned toothed wheel on the drum shaft by means of an adjustable crank pin. This arrangement compelled the large toothed wheel to perform the double duty of both winding and pumping; thus, not only was a great strain thrown on this wheel, but the work to be done could not be evenly distributed over the working parts of the engine, since the whole strain was thrown on one side only. Moreover, in case of a break-down of this toothed wheel both pumping and winding had to be suspended until the break-down was repaired. To remedy this evil, and to balance the work more evenly over the whole of the working parts, Messrs. A. Chaplin and Co. have now introduced for Messrs. Wm. Baird and Co., of Gartsherrie, the Bridgewater Trustees, and others some improvements in this respect in the class of engine herewith illustrated. They make the pumping gearing quite independent of that for winding, and place the pumping gearing on the opposite side of the bed-plate to that on which the drum driving-wheel is attached. They accomplish this improvement by fitting up a fly-wheel on the crank-shaft outside, on the opposite side of the sole-plate to that on which the drum toothed wheel is fitted. A pinion cast on the outside of the fly-wheel gears into a large toothed wheel, which is supported by a shaft running into the bed-plate. It is to this last-mentioned wheel that the pump connecting-rod is attached by means of the ordinary crank-pin. The engines are fitted up with link-motion for reversing, and all usual mountings, and are non-condensing, with vertical action.

Whereas the class of engine just described is specially adapted for pits, quarries, inclines, &c., in our second figure we illustrate an arrangement of Chaplin's Portable Winding-Engines adapted to situations where frequent removal is necessary, and where it is desired to avoid the trouble and expence of taking down and re-erecting engine and gearing when removing the same. As will be seen on referring to our woodcut, the engines, boiler, drum, and gearing are all combined on one frame of wrought-iron, which is fitted with track wheels, the front pair being made to swivel, and horse trams being also provided when desired for convenience of removal from place to place.

The boiler, which is of the same type as before described, is mounted on the centre of the truck carriages. To increase, however, the heating surface of the boilers Messrs. Chaplin and Co. also introduce their hanging tubes into the fire-box when desired. These tubes are fixed into the tube-plate of boiler or fire-box shell, and may be easily removed or renewed. The additional heating surface thus obtained naturally increases the efficiency of the boiler, since this arrangement and grouping of the lower ends of the tubes prevent the direct upward passage of the flames, which are drawn to the sides of the fire-box and then across the tubes in their passage to the take-up or smoke-pipe, thus acting upon the whole of the tubes. These boilers are also tested to twice their working pressure before leaving the works.

The engines are made each with one pair of cylinders, as most suitable for this class of work. Two upright standards, respectively placed on each side of the boiler, carry each one steam cylinder, and outside of these the truck carriage is also made to carry two drums. Each drum is provided with a large toothed wheel, which gears into two pinions fitted up on the crank-shaft ends. The crank-shaft is supported on pedestals bolted to the sole-plate, and is worked in the usual manner from the steam-cylinders. Each drum is fitted with an independent brake, for lowering without the aid of the engines, and either drum may be thrown out of gear when the working of the one only is desired. The engines and gearing are so arranged that when hoisting with one drum and lowering simultaneously with the other the whole power of the double cylinder engine is available for the load being lifted, and with the two independent drums material can either be drawn upon two shafts or pits, or three drums may be so worked together that whilst one is working a shaft the other may be employed in working an incline. The drum-shafts may, moreover, be made of sufficient length to receive niche rings for flat wire-rope should this be desired.

In conclusion, the engines are fitted complete with link-motion and all usual mountings, and the various levers and handles for working the gearing are placed within easy reach of the attendant.

ROLLING MILLS.—The invention of Mr. I. HAHN, of Pittsburgh, U.S., consists in an arrangement of five-high rolling mill, wherein the inner working rolls are supported by strong outer rolls, which are trussed to give greater strength, the support and adjustment of the rolls being effected by hydraulic pressure; and means are described of driving the several rolls by belting, so arranged as to tighten itself, notwithstanding displacement of the rolls.

FOREIGN MINING AND METALLURGY.

Copper has been tending downwards upon the Paris market. Chilian in bars, delivered at Havre, has made 80*l.* per ton; ditto, ordinary descriptions, 79*l.* per ton; ditto in ingots, 84*l.* per ton; English tough cake, 84*l.* per ton; and pure Corocoro minerals, 82*l.* per ton. Quotations for copper, which had somewhat improved at Marseilles, have again given way. The aspect of the German copper markets remains much the same; transactions are limited to the strict requirements of consumption, and prices have no stability. The Paris tin market has been feeble; Banca, delivered at Havre or Paris, has made 88*l.*; Straits, ditto, 79*l.*; and English, delivered at Havre or Rouen, 79*l.* per ton. Although the Rotterdam tin market has been very quiet, holders have maintained their prices, and transactions have been rendered rather difficult in consequence. Disposable Banca has been held at Rotterdam at 49½ fl. Billiton has found purchasers at 45⅝ fl., but the latest price was 45½ fl. The German tin markets have been very quiet. Quotations for lead have exhibited feebleness at Paris; French, Spanish, and English lead have been quoted at the uniform rate of 22*l.* per ton. The Berlin lead market has been pretty well sustained. There has been scarcely any business passing in zinc at Paris. At Marseilles rolled Vieille-Montague zinc has made 32*l.* per ton. The German zinc markets have been fairly supported.

There is nothing very interesting to report with respect to the French coal trade; prices and market tendencies are the same as they were a few days since, and they will probably still remain so for some time to come. The commencement of the spring is usually the dead season of the coal trade, and this year is no exception to the general rule. Great damage has been inflicted upon several colliery workings by recent floods; this damage is even greater than had been at first supposed. The interruption of navigations by the floods has been, however, a matter of secondary importance, as the railways have been enabled to readily meet the requirements of the trade. Considerable quantities of English coal continue to be imported into France, and French coalowners are asking for an improvement of navigations and other means of communication, in order to enable them to more fully develope their properties, and to increase the supplies of indigenous French coal. The directors of the Carmaux Mines Company propose a dividend for 1875 at the rate of 3*l.* 4s. per share. The Haute-Loire Collieries Company will pay, April 1, a dividend of 2*l.* 4s. per share.

There is little new to communicate with respect to the French iron trade; nothing has occurred to seriously confirm the revival in business rather pompously announced of late. Working operations are certainly carried on, but not with the full activity desirable, nor at the rates which could be wished for. Measures are under consideration for improving the navigation of the Seine, the Loire, and the Rhône; railway extension is being discussed, and a good deal of attention is being devoted to tramways, and especially to tramways with mechanical motors. The French Society of Civil Engineers has been especially occupying itself with this latter question, and has discussed very seriously the advantages or otherwise of the Mekarski compressed air system. A question which has come to the front is whether tramway engines of large dimensions are more economical as regards the consumption of coal than smaller ones. The direct exports of iron from France in the first two months of this year were 4000 tons less than the corresponding exports in the corresponding period of 1875.

At an adjudication for trucks which has just taken place in Belgium the lowest tender was that of Herr Vanderzeypen, of Deutz-on-the-Rhine. The tenders sent in were for eight-wheeled platform trucks, to carry 20 tons each, and Herr Vanderzeypen offered to supply the trucks at 206*l.* per truck, while the lowest Belgian tender—that of the Dyle Works—required 220*l.* per truck. It is difficult, however, to see how the Germans can have the means of executing orders more promptly or more cheaply than the Belgians, who, especially as regards trucks, possess construction establishments equipped in the best and most complete manner. The general condition of the Belgian iron trade is considered to be slightly improving; orders are arriving little by little at the rolling-mills, and in the demand for merchants' iron especially an improvement is noticeable. Employment is certainly not now wanted, but at the same time prices have ruled very low. This will be the case in all probability so long as the demand for Belgian iron falls below its production. An adjudication for 775 tons of rails with fish-plates is about to take place for the Central Netherlands Railway. The shareholders of the Rhine and Nassau Mines and Ironworks Company, at Stolberg, will receive a dividend for the past year at the rate of 8 per cent. per annum.

The state of the Belgian Coal Trade has presented little change. The waters have began to fall, and it will soon be possible to resume deliveries, which have been interrupted for some time past. A slight revival is considered to have taken place in the Belgian iron trade, but it has not exerted any sensible influence on the coal trade. Moreover, the Belgian coal trade has entered upon its usual quiet season. Advices from Bochum complain that in that district coalowners have to sell their coal almost at cost price; they have, however, decided not to go below this limit, but rather to pay off their workpeople. No serious improvement is now expected to be witnessed in the Belgian coal trade until the winter, at the same time it is considered that prices have gone to their minimum point. Rates are very variable, and differ according to the quantities purchased; the purchaser, to some extent, makes his own terms, and shows himself more exacting in proportion to the orders which he gives out. The Bonne Espérance Colliery Company commenced the payment of its dividend for 1875 on Saturday.

GAS FURNACES.—The features of novelty in the invention of Mr. T. FLETCHER, of Warrington, consists in constructing such furnaces of fire-clay or other suitable material with a series of tubes or passages surrounding the internal recess in which the crucible or substance to be heated is placed, such tubes or passages being open to the central recess at one end and communicating at the other end with one common passage which leads to the chimney. In this construction which is applicable to gas and other furnaces the flame of gas or other fuel is admitted by preference to the central recess near the top thereof and is thus compelled to be deflected downwards in order to enter the upright tubes in escaping towards the chimney, and thus the flame will be baffled, the smoke consumed, and the heat utilised without the loose internal casings employed in gas furnaces as hitherto practised.

COMPRESSING SCRAP METAL.—The machine invented by Mr. LEWIS J. ATTWOOD, of Waterbury, Connecticut, U.S., consists essentially of a hydraulic cylinder and its ram, a fixed compressing tool or bar, and two hinged and sliding boxes or receivers, in which the scrap or other waste metal is placed. The hydraulic cylinder is carried by a lower cross head, and the fixed compressing tool is carried by an upper cross-head, the boxes or receivers being hinged to and sliding upon side rods between the two cross heads. One of the boxes having been charged with the scrap or waste metal it is turned under the fixed compressing tool, and on to a rest or table fixed to the hydraulic ram. By the lifting of the hydraulic ram the chamber or chambers in the box or receiver is or are made to slide over or upon the fixed compressing tool, whereby the metal in the box or receiver is compressed with great force, and the particles in the said box consolidated into a compact mass, ready to be placed in the crucible for re melting. While the metal in one box is being compressed the other box may be filled with the waste metal.

MANUFACTURE OF IRON AND STEEL, AND ARTICLES THEREFROM.—Mr. J. G. WILLANS, of St. Stephen's Crescent, Bayswater, describes the manufacture of a cast-iron containing a little silicon or phosphorus by melting down steel in contact with carbon in a cupola furnace. He makes malleable castings, also steel, from such cast iron. He lessens the oxidation of heated iron or steel, and makes its surface smoother by conveying in a current of air, gas, or other fluid on to its surface some finely-divided siliceous or non-volatile saline substance that will render the oxide of iron scale into a fused state. In the manufacture of iron or steel tubes he applies like substances to the interior of the tube to lessen the friction on the mandril. In the manufacture of steel castings he improves their solidity by placing carbon on the slag in the melting vessel, or he removes the slag and substitutes another containing little or no oxide.

THROAT IRRITATION.—The throat and windpipe are especially liable to inflammation, causing soreness and dryness, tickling and irritation, inducing cough, and affecting the voice. For these symptoms use glycerine in the form of jujubes. Glycerine, in these agreeable confections, being in proximity to the glands at the moment they are excited by the act of sucking, becomes actively healing: 6d. and 1s boxes (by post 8 or 15 stamps), and tins, 1s. 6d., labelled "JAMES EPPS AND Co., Homœpathic Chemists, 48, Threadneedle-street, and 170 Piccadilly, London."

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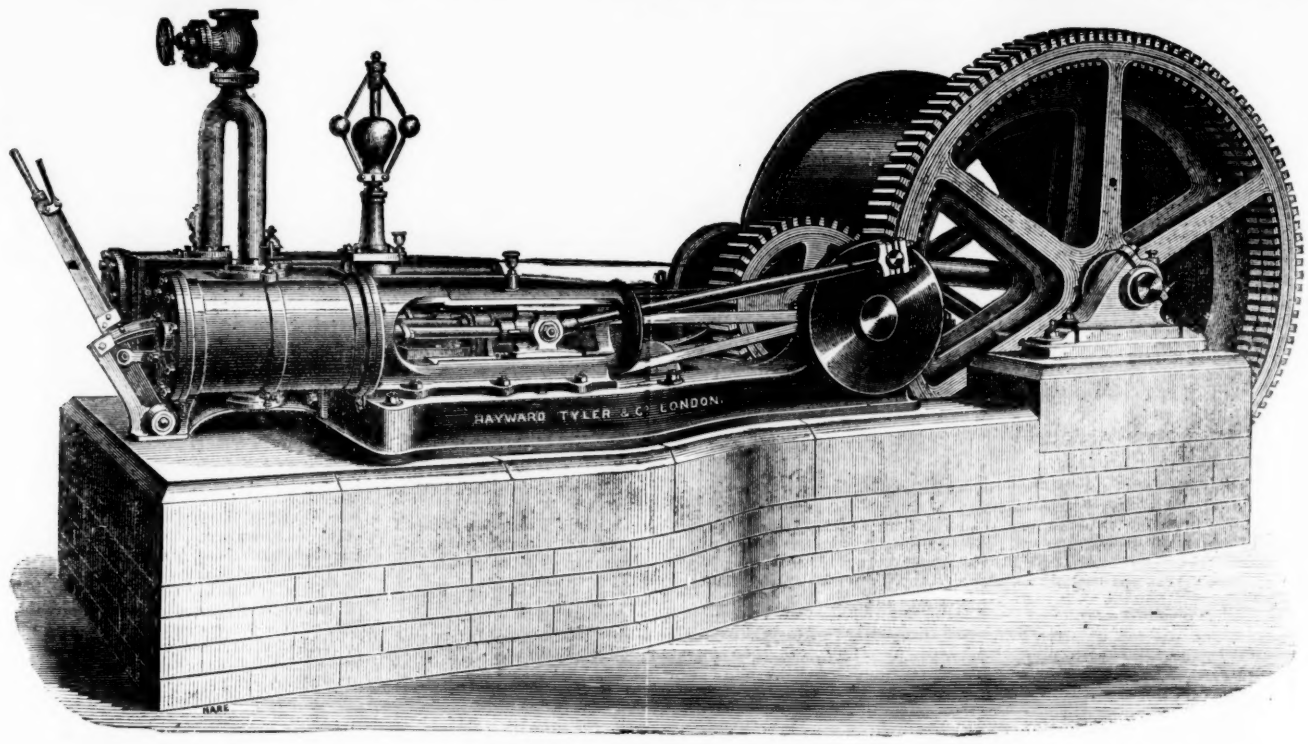

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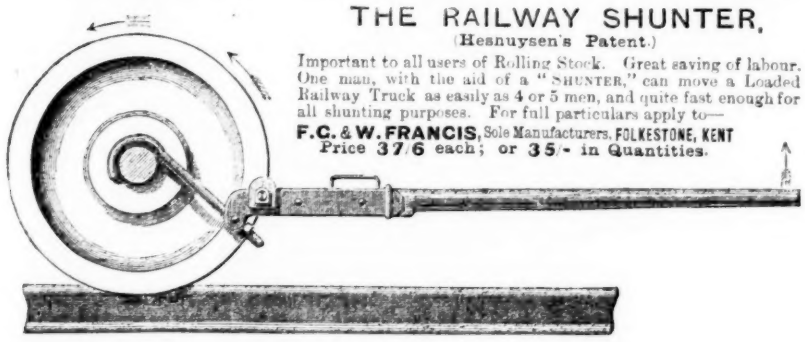

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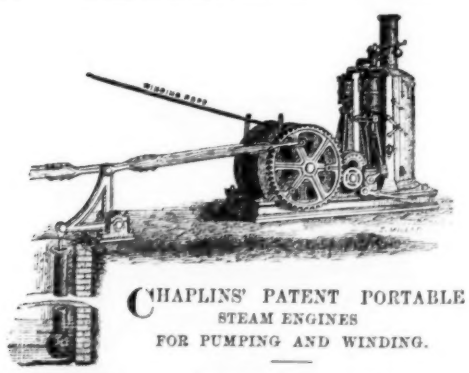

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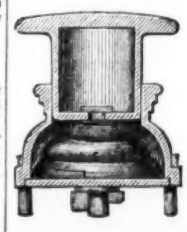

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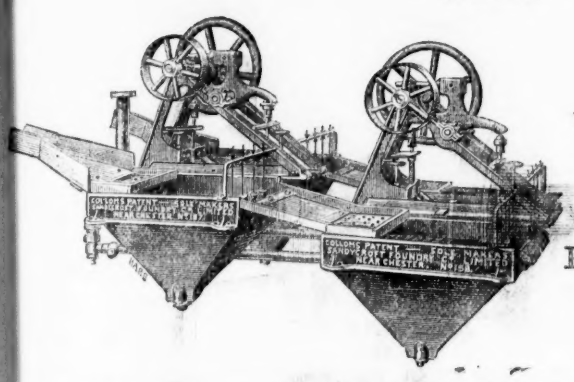

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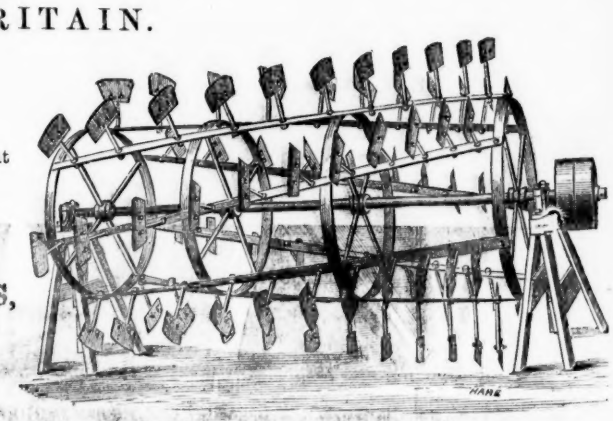

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"The 'Burleigh' Rock Drills have been in active operation for three years in these quarries, and the results obtained by their employment have been of the most satisfactory character, and they are superior to all others."

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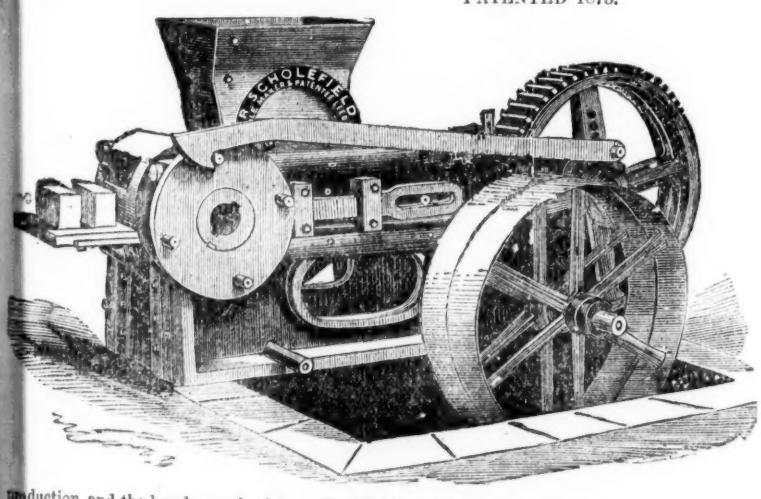
LATEST PATENT BRICK-MAKING MACHINE.

PATENTED 1873.



R. S. begs to call the attention of all Colliery Owners in particular to his PATENT SEMI-DRY BRICK MACHINE, and the economical method of making bricks by his patent machinery from the refuse that is taken from the pits during the process of coal-getting, which, instead of storing at the pit's mouth (and making acres of valuable land useless), is at once made into bricks, at a very small cost, by R. S.'s Patent Brick-making Machinery. If the material is got from the pit hill, the following is about the cost of production, and the hands required to make 10,000 pressed bricks per day:—

2 men digging, each 4s. per day	£0 8 0
1 man grinding, 4s. 6d. per day	0 4 6
1 boy taking off bricks from machine, and placing them in barrow ready for the kiln, 2s. per day	0 2 0
1 boy greasing, 1s. 6d. per day	0 1 6
1 engine-man, 5s. per day	0 5 0
1 man wheeling bricks from machine to kiln, 4s. per day	0 4 0
Total cost of making 10,000 pressed bricks	£1 5 0, or 2s. 6d. per 1000.

(SETTING AND BURNING SAME PRICE AS HAND-MADE BRICKS.)

N.B.—Where the material can be used as it comes from the pit, the cost will be reduced in digging.
As the above Machinery is particularly adapted for the using up of shale, bind, &c., it will be to the advantage of all Colliery Owners to adopt the use of the said Brick-making Machinery.

THE MACHINES CAN BE SEEN IN OPERATION AT THE WORKS OF THE SOLE MAKER AND PATENTEE DAILY.

SCHOLEFIELD'S ENGINEERING & PATENT BRICK MACHINE WORKS,
KIRKSTAL ROAD, LEEDS.

J. WOOD ASTON AND CO., STOURBRIDGE

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Manufacturers of

CRANE, INCLINE, AND PIT CHAINS,

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES and FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

Crab Winches, Pulley and Snatch Blocks, Screw and Lifting Jacks, Ship Knees, Forgings, and Use Iron of all descriptions,
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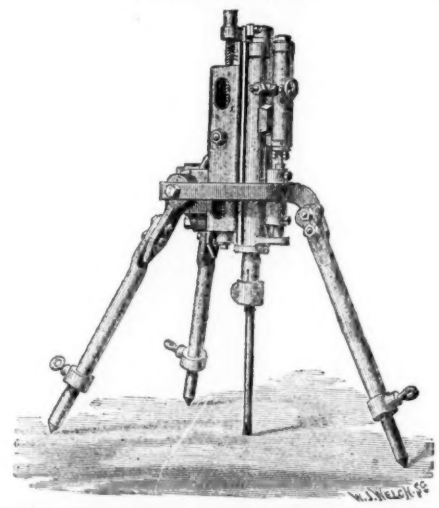
For Tunnels, Mines, Quarries,

AND OTHER WORKS.



Intending purchasers can satisfy themselves that the advantages claimed for the "CHAMPION" over all other Rock Borers are not over-estimated.

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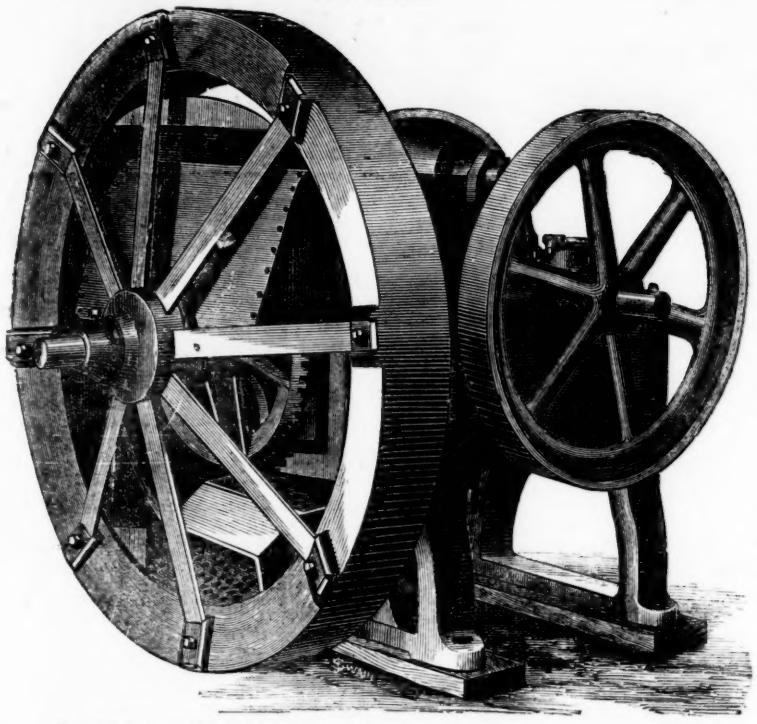

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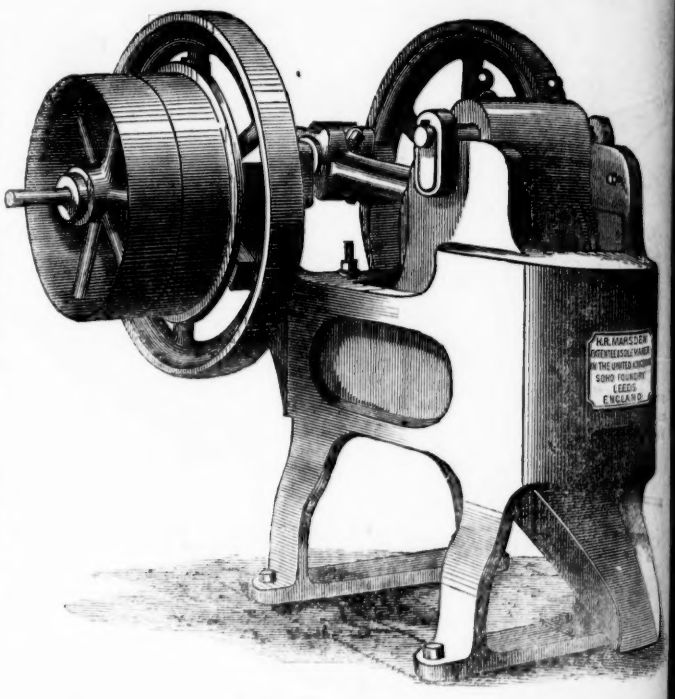

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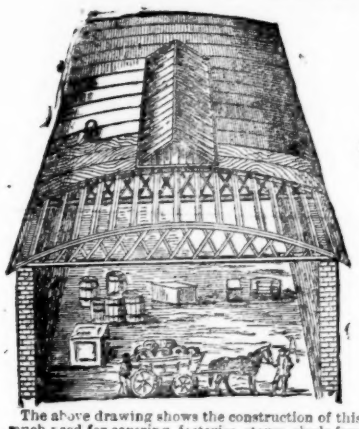

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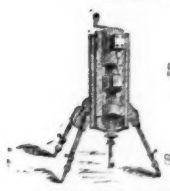

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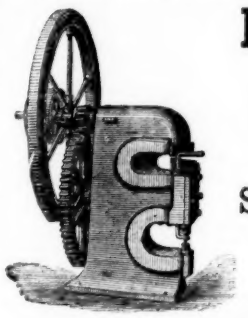

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